UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

INTEL CORPORATION,	)	Case No.
	)	IPR2019-00047
Petitioner,	)	IPR2019-00048
	)	IPR2019-00049
vs.	)	IPR2019-00128
	)	IPR2019-00129
QUALCOMM INCORPORATED,	)	
	)	U.S. Patent No.
Patent Owner.	)	9,154,356

DEPOSITION OF PATRICK FAY, PH.D.

South Bend, Indiana

Wednesday, August 7, 2019

Reported by:

RACHEL F. GARD, CSR, RPR, CLR, CRR

JOB NO. 165197

P. FAY, PH.D.

August 7, 2019

9:30 a.m.

Deposition of PATRICK FAY, PH.D., at Morris Inn, 1399 North Notre Dame Avenue, South Bend, Indiana, pursuant to notice before Rachel F. Gard, Illinois Certified Shorthand Reporter, Registered Professional Reporter, Certified LiveNote Reporter, Certified Realtime Reporter, Indiana Notary Public.

P. FAY, PH.D.

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I N D E X

E X H I B I T S

P. FAY, PH.D.

(Witness sworn.)

WHEREUPON:

PATRICK FAY, PH.D.,

called as a witness herein, having been first duly sworn, was examined and testified as follows:

CROSS-EXAMINATION

BY MR. RITCHIE:

Q. Would you state and spell your name for the record, please.

A. Yes. I'm Patrick Fay. P A T R I C K. Surname is Fay, F A Y.

Q. And what is your current address?

A. My home address is 16045 Baywood Lane, Granger, Indiana.

Q. You've been deposed before?

A. I have.

Q. So is it fair to say that you understand the deposition process?

A. At some level, yeah.

Q. You understand that you're testifying under oath today?

A. I do.

Q. And is there any reason you cannot

testify fully and truthfully today?

A. No, there's no reason.

Q. Please let me know if you don't understand a question and I will try to clarify it for you. If you do answer, I'm going to assume you understand -- understood my question. Is that fair?

A. That's fair.

Q. If you need to take a break, just let me know. We can take a break as long as there's not a question pending. Okay?

A. Okay.

Q. You understand that this deposition pertains to your declarations in five IPR proceedings. Those matters are numbered: IPR2019-00047, IPR2019-000489, IPR2019-00049, IPR-00128 [sic], and IPR2019-00129.

You understand that this deposition pertains to your declarations in those five matters?

A. Yes.

Q. Now, I may refer to the patent, which is the subject of your declarations, which is U.S. Patent 9,154,356. I may refer to

that as the '356 Patent. When I say the '356 Patent, will you understand that I'm referring to U.S. Patent 9,154,356?

A. Yes, I will.

Q. Thank you.

(INTEL Exhibit 1002 marked for identification.)

Q. I've handed you what has been marked as Exhibit INTEL 1002. Do you recognize Exhibit INTEL 1002 as the declaration you submitted in IPR2019-00047?

A. Yes, I recognize this document.

Q. And this document sets forth your opinions in their entirety concerning the validity of the '356 Patent in connection with IPR2019-00047?

MR. FERNANDEZ: Objection. Form.

A. This document states my opinions with regard to the validity of the '356 Patent as related to the reference of Uehara and the other cited references that are contained in the declaration.

Q. Yes. And this is a -- this is the complete set of your opinions with respect to

those references that are addressed in IPR2019-00047?

MR. FERNANDEZ: Objection. Form.

A. With respect to the reference that I cite by Uehara and the 3GPP Feasibility Study, the reference by Parumana, the reference by Youssef, and related combinations, this document sets forth my opinions.

Q. And those are the only references your declaration cites with respect to IPR2019-00047; is that correct?

A. I'm sorry. Could you repeat the question for me?

Q. You identified several references. And my question was: Those are the only references your declaration cites with respect to IPR2019-00047, correct?

MR. FERNANDEZ: Objection. Form.

A. I believe the references I listed previously --

Q. Let me retract that.

A. Okay.

Q. It's not trying to be a trick question. For IPR2019-00047 that's on the

front, this is a complete statement of your opinions for that matter? There are four other matters. We're going to address those.

MR. FERNANDEZ: Objection. Form.

A. My opinions on the invalidity of the '356 Patent with respect to the references cited within this document are all listed here in this declaration.

Q. Thank you. You've signed this document; that's your signature at the end? Page 121.

A. Yes, that is my signature.

Q. Are you aware of any mistakes or errors in this document?

A. I have found a few typographical errors but nothing that affects the substance or that makes a material difference to the rationale or the bases of the declaration.

Q. That's fair. Now, in Paragraphs 10 and 11, you identified that you -- materials that you have reviewed for this declaration in IPR2019-00047. That's a complete list of the materials that you've reviewed for this declaration?

A. Sorry. Did you say Page 10?

Q. Paragraphs 10 and 11.

A. Oh, excuse me. I thought you said "page." Excuse me.

The references and documents described in Paragraphs 10 and 11 are those on which I rely for my declaration.

Q. My -- you substituted the word "rely" for "review."

My question was: Did you review any other materials in connection with preparing this declaration?

MR. FERNANDEZ: Objection. Form.

A. I have reviewed and read a number of other documents and things, but I don't rely on them for this declaration.

Q. What does that mean, you don't rely on them?

A. The rationale -- as you see in my declaration, these are the ones that I cite to that I quote that I find show various aspects. Other things that I may have reviewed, I don't rely on for the purposes of this declaration.

Q. What other materials did you review

in connection with this declaration?

A. I don't know that I have a list for you. I read a bunch of things.

Q. Do you have them -- do you have a list somewhere, just not with you today?

A. No. I'm not sure I have a list even.

Q. So you don't know what other materials you've reviewed in connection with this declaration?

A. In connection with this declaration, the content of this declaration comes from the references that I've listed here. Anything else was -- I found I did not need to rely upon to form this declaration.

Q. You can set that aside for the moment.

(INTEL Exhibit 1102 marked for identification.)

Q. I'm handing you what's been marked as INTEL 1102. Do you recognize Exhibit INTEL 1102 as the declaration you submitted in IPR2019-00048?

A. Yes, this looks like the declaration

that I submitted in response to that petition.

Q. This document sets forth your opinions in their entirety concerning IPR2019-00048?

MR. FERNANDEZ: Objection. Form.

A. Yes. This document does set forth my opinions as related to that, the IPR that you quoted, the 00048, yes.

Q. And that's your signature at the end on Page 116?

A. Yes, that is my signature.

Q. Other than typographical mistakes, are you aware of any mistakes or errors in this document?

A. No, other than typographical errors, I am not aware of any material errors in this document.

Q. In Paragraphs 10 and 11, you identify materials that you have reviewed in connection with this IPR. Is that a complete list of materials that you reviewed for this IPR?

MR. FERNANDEZ: Objection. Form.

A. Paragraphs ...

The list here in Paragraphs 10 and 11 are the documents on which I relied when I formulated this declaration.

Q. And you reviewed other materials in connection with this declaration that are not listed here?

A. It is -- yes. Yes, I did.

Q. And as before, you don't have a list of those materials?

A. I do not.

Q. You can set that aside for the moment.

(INTEL Exhibit 1202 marked for identification.)

Q. Handing you what has been marked as INTEL 1202, do you recognize Exhibit INTEL 1202 as the declaration you submitted in Case IPR2019-00049?

A. Yes, I recognize this document as the declaration that I prepared in response to this IPR.

Q. This document sets forth your opinions in their entirety concerning IPR2019-00049?

MR. FERNANDEZ: Objection. Form.

A. This document sets forth my opinions with respect to the IPRs 2019-00049 as it relates to the combination of Jeon, Xiong, and the combination also with the 3GPP Feasibility Study. And I guess I -- yes, yes.

Q. And this is the complete set of your opinions with respect to those combinations that you identified?

MR. FERNANDEZ: Objection. Form.

A. This declaration sets forth my opinions with respect to these specific claims and those specific references.

Q. And it's complete? You have no other opinions on these references outside of what you've identified in this document?

MR. FERNANDEZ: Objection. Form.

A. This document outlines the opinions I have as of this time for these matters.

Q. That's your signature at the end on Page 123?

A. Yes, that is my signature.

Q. And in Paragraphs 10 and 11, you identify materials that you have reviewed for

your declaration in IPR2019-00049. Are the materials that you have identified in Paragraph 10 and 11 a complete list of the materials that you reviewed for this declaration?

MR. FERNANDEZ: Objection. Form.

A. The documents listed in Paragraphs 10 and 11 are the -- is a complete list of the documents upon which I relied when I prepared this declaration.

Q. And you've reviewed additional materials in preparing this declaration, but you don't have a list of those?

A. I have reviewed additional materials, but I don't rely on any of them for purposes of this declaration.

Q. And you don't have a list of those additional materials?

A. No, I do not.

(INTEL Exhibit 1302 marked for identification.)

Q. Handing you what has been marked as Exhibit INTEL 1302, do you recognize Exhibit INTEL 1302 as the declaration you submitted in

Case IPR2019-00128?

A. Yes, I recognize this as the declaration that I filed in association with the IPR you quoted.

Q. This document sets forth your opinions in their entirety concerning IPR2019-00128?

MR. FERNANDEZ: Objection. Form.

A. This document sets forth my opinions at the present time with respect to the '356 Patent and its obviousness and how -- and how it's -- how should I say this? This document sets forth my opinions at the present time with respect to the anticipation and obviousness analysis that I did with respect to the claims listed here in view of Lee and the 3GPP Feasibility Study.

Q. And that was done in connection with IPR2019-00128?

A. Yes, that's correct.

Q. And that's your signature at the end on Page 95?

A. Yes, that is my signature.

Q. Other than typographical errors, are

you aware of any mistakes or errors in this document?

A. No. Other than those sorts of minor errors that don't affect the substance of the analysis, I'm not aware of any errors.

Q. In Paragraphs 10 and 11, you identify materials that you reviewed in connection with this declaration. Are the materials identified in Paragraphs 10 and 11 a complete list of the materials that you reviewed in connection with this declaration?

MR. FERNANDEZ: Objection. Form.

A. The documents listed in Paragraphs 10 and 11 are the full set of documents that I rely on for the declaration.

Q. In connection with this declaration, you reviewed additional materials not identified in Paragraphs 10 and 11?

A. I certainly read additional materials not listed here, but those references that are listed there are those on which I rely for the declaration.

Q. And as before, you don't have a list of those additional materials that you

reviewed?

A. I do not.

(INTEL Exhibit 1402 marked for identification.)

Q. Handing you what has been marked as INTEL 1402, do you recognize Exhibit INTEL 1402 as the declaration you submitted in Case IPR2019-00129?

A. Yes. I recognize this document as the declaration I submitted in relation to the IPR, Case IPR2019-00129.

Q. And Exhibit INTEL 1402 sets forth your opinions in their entirety in connection with IPR2019-00129?

MR. FERNANDEZ: Objection. Form.

A. This declaration sets forth my opinions at the present time with respect to this IPR.

Q. And that's your signature at the end on Page 103?

A. That is my signature.

Q. And other than typographical mistakes, are you aware of any other mistakes or errors in this document?

A. I am not aware of any mistakes besides typographical-type errors.

Q. In Paragraphs 10 and 11 of Exhibit INTEL 1402, you identify materials that you have reviewed for this declaration. Do Paragraphs 10 and 11 contain a complete list of materials that you reviewed for this declaration?

MR. FERNANDEZ: Objection. Form.

A. Paragraphs 10 and 11 list the documents that I reviewed and rely on for the declaration.

Q. But you did review additional materials in connection with this declaration that are not identified in Paragraphs 10 and 11?

A. I did review additional materials, but the documents listed here in Paragraphs 10 and 11 are those on which I rely for the declaration.

Q. And you don't have a list of those additional materials, correct?

A. I do not.

Q. Now, in connection with these five

declarations that we've just discussed, did anyone assist you in your research, investigation, or testing?

MR. FERNANDEZ: Objection. Form.

A. Could you repeat the question for me, please?

Q. In connection with these declarations that you've prepared in these five IPRs, did anyone assist you in your research, investigation, or testing to prepare these declarations?

MR. FERNANDEZ: Same objection.

A. Yes.

Q. Who assisted you in your research, investigation, or testing in preparing these declarations?

A. I received assistance from the counsel for the petitioner.

Q. Did anyone assist you in formulating your opinions in connection with these five IPRs?

A. The opinions in these five -- that are delineated in these five declarations are my own.

Q. Did anyone assist you in preparing these five declarations?

A. I prepared these five declarations, but I did have assistance from staff at the petitioner's counsel.

Q. You have in front of you Exhibit INTEL 1402, I think?

A. Yes, that's correct.

Q. In Paragraph 56 of that declaration, you identified the level of ordinary skill in the art, correct?

A. Yes, that's right. At Paragraph 56, I identify the level of ordinary skill in the art.

Q. And one of the things you said in that paragraph was a person of ordinary skill in the art at the time of the alleged invention would have had experience with the structure and operation of RF transceivers and related structures, correct?

MR. FERNANDEZ: Objection. Form.

A. That's not quite exactly what I said.

Q. That was one of the things you said.

But you want to go ahead and correct me and tell me what you did say there.

MR. FERNANDEZ: Objection. Form.

A. Paragraph 56 reads: A person of ordinary skill in the art at the time of the alleged invention would have had at least an M.S. degree in electrical engineering or equivalent experience and would have had at least 2 years of experience with the structure and operation of RF transceivers and related structures or the equivalent.

Q. Thank you.

Dr. Fay, do you consider yourself an expert in the structure and operation of RF transceivers?

A. Yes.

Q. Are you familiar with LTE wireless systems?

A. I am familiar with some aspects of LTE wireless systems, yes.

Q. What aspects of LTE wireless systems are you familiar with?

A. I am familiar with the hardware, the supporting LTE communications systems, and in

particular in receivers.

Q. Do you consider yourself an expert in the structure and operation of LTE wireless systems?

A. That's very vague.

Q. And why is that vague?

A. "Systems" is a very vague word.

Q. Do you consider yourself an expert in the structure and operation of LTE wireless communications?

A. I don't understand the question.

Q. You said you were familiar with hardware, in particular receivers, in LTE systems. Is that right?

A. I am familiar with the hardware and, in particular, receivers for wireless communications such as LTE, that's right.

Q. Do you consider yourself an expert in the hardware and, in particular, receivers of wireless communications such as LTE?

A. Yes.

Q. Are there any other aspects of LTE wireless communications that you consider yourself an expert in?

MR. FERNANDEZ: Objection. Form.

A. As I sit here today, that sounds -- that hardware and -- hardware and, in particular, receivers for wireless communications I think is an accurate description of my expertise, my relevant expertise at least for the '356 Patent. I'd have to think more about whether there are other areas that are relevant to LTE where I have expertise.

Q. Are you familiar with carrier aggregation in LTE?

MR. FERNANDEZ: Object to form.

A. I am familiar with carrier aggregation.

Q. Do you consider yourself an expert in carrier aggregation with respect to LTE wireless communications?

A. Yes. I consider myself an expert with respect to carrier aggregation.

Q. Do you have any research experience directed to carrier aggregation?

MR. FERNANDEZ: Objection. Form.

A. I have considerable research

experience and publications in devices and circuits devoted to receivers and applicable to receivers in wireless communication systems. While my -- carrier aggregation has not been a focus of any particular paper, the devices and other research that I have done is applicable to carrier-aggregated systems.

Q. Do you have any teaching experience directed to carrier aggregation?

MR. FERNANDEZ: Objection to form.

A. I teach two circuit design courses that, while we don't explicitly cover carrier aggregation, we do cover at the undergraduate level circuit design techniques for designing low-noise amplifiers that would be perfectly suitable for carrier-aggregated systems.

Q. Have you authored any publications that explicitly reference carrier aggregation?

A. I would have to review them. Sitting here today, I'm not certain if any of them include that or not.

Q. Prior to being retained to offer opinions relating to the '356 Patent, had you heard the term "carrier aggregation"?

A. Yeah, I believe I had.

Q. And when would -- when did you first hear the term carrier aggregation?

A. I'm not certain.

Q. Can you say approximately?

A. Not with any certainty, no.

(INTEL Exhibit 1001 marked for identification.)

Q. Handing you what's been marked as INTEL 1001. Do you recognize INTEL 1001 as the '356 Patent?

A. Yes, I recognize this as the '356 Patent.

Q. And you reviewed and considered the '356 Patent during your analysis?

A. Yes, I reviewed and considered the '356 Patent for my analysis.

Q. And you reviewed and considered the '356 Patent's prosecution history during your analysis as well?

A. Yes. I did review the prosecution history of the '356 Patent during the course of my analysis.

Q. I'd like to direct your attention to

Figure 6A of the '356 Patent. Let me know when you're there.

A. Yes, I'm there.

Q. Figure 6A shows a number of things. But one of the things it shows is two amplifier stages identified as 650a and 650b, correct?

A. Yes, the patent identifies 650a and 650b as amplifier stages.

Q. And in particular on the figure, 650a is identified as Amplifier Stage 1 and 650b is identified as Amplifier Stage 2, correct?

A. I don't recall them making those labels. I don't recall them being labeled as Stage 1 and Stage 2.

Q. If you look at Figure 6A, do you agree with me that --

A. Oh, I'm sorry.

Q. -- figure shows Amplifier Stage 1 as 650a and Amplifier Stage 2 as 650b?

A. Yes, on the figure. I now see what you're pointing to, yes. Yeah, Amplifier Stage 1 in the Figure 6A is identified as 650a, and 650b is identified as Amplifier Stage 2.

Q. And Amplifier Stage 650a amplifies an RF input signal and provides a first output signal -- a first output RF signal, I'm sorry, to a Load Circuit 690a, correct?

A. Not in all cases, no.

Q. In what cases does it provide an output signal to Load Circuit 690a?

A. I'm sorry. I didn't catch your question exactly. Could you rephrase it or repeat it for me?

Q. You had responded "Not in all cases." And my question was: In what cases does Amplifier Stage 650a provide a first output RF signal to Load Circuit 690a?

A. The Amplifier Stage 650a provides an output signal to Load Circuit 690a when an RF input signal is provided and when the amplifier stage is enabled.

Q. And with respect to Amplifier Stage 2, when it's enabled and when an RF input signal is provided, it provides an output signal -- an output RF signal to load circuit 690b, correct?

A. Your question was long enough, could

you just repeat it for me to make sure I have it correctly?

Q. Sure.

Talking about Amplifier Stage 2. And Amplifier Stage 2 amplifies an RF input signal and provides an output RF signal to load circuit 690b when it's enabled, correct?

A. Amplifier -- Amplifier Stage 2 provides an output signal to Load Circuit 690b in response to the RF input signal when Amplifier Stage 2 605b is enabled.

Q. According to the patent -- and I'm looking at column 8, row 12. According to the patent, Amplifier Stage 650a may be independently enable or disabled via switch 658a. Correct?

A. Could you repeat your question for me, please?

Q. According to the patent, Amplifier Stage 650a may be independently enabled or disabled via switch 658a?

A. In the particular embodiment shown in Figure 6A, they show switch 658a configuring the enablement or disablement of Amplifier

Stage 650a.

Q. And more specifically, the patent says that that switch may be used to independently enable or disable Amplifier Stage 650a?

A. Yes, that switch may independently enable or disable that Amplifier Stage 650a.

Q. And switch 658b may be used to independently enable or disable Amplifier Stage 650b?

A. Was there a question?

Q. Yes.

And do you agree that switch 658b may be used to independently enable or disable amplifier stage 650b?

A. The patent says it a little bit differently. But my interpretation is that switch 658b may be used to independently enable or disable Amplifier Stage 658b.

Q. Amplifier Stage 650b, correct?

A. Did I misspeak? 650b is what I meant to say for amplifiers, for the amplifier stage.

Q. Now, if you turn to claim 1, which

is in column 20, and I'm looking at the first limitation that starts at Line 44, and it recites, and I'm going to read just a part of that first limitation it recites -- claim 1 of the '356 patent recites: A first amplifier stage configured to be independently enabled or disabled, comma, the first amplifier stage further configured to receive and amplify an input radio frequency, paren, RF, close paren, signal and provide a first output RF signal to a first load circuit when the first amplifier stage is enabled.

Did I read that first part of that limitation correctly?

A. I believe you read that first part of that limitation correctly.

Q. You offered opinions in your declarations about the prior art with respect to that portion of the limitation, correct?

MR. FERNANDEZ: Objection. Form.

A. Yes. In my declaration, I offer -- I show where prior art discloses that limitation.

Q. For the opinions that you offered in

these IPR proceedings, what was your understanding of the meaning of the phrase "independently enabled or disabled" in claim 1?

MR. FERNANDEZ: Objection. Form.

A. Could you repeat your question for me?

Q. For the opinions that you offered in these IPR proceedings, what was your understanding of the meaning of the phrase "independently enabled or disabled" in claim 1?

MR. FERNANDEZ: Same objection.

A. For the opinions I put forth, my interpretation of "independently enabled or disabled" meant that each -- the amplifier stages had to be configured to allow them to be -- to -- had to be configured to enable or disable each amplifier stage independently of whether or not any other amplifier stage is enabled or disabled, as I say in my declaration. That's in -- that particular quote is in Paragraph 84 of my declaration 00048.

Q. Paragraph 84 of 00048?

A. Let me double-check. Yes,

Paragraph 84 in the 00048.

Q. And would you read me the sentence or point me to the sentence that you're referring to in particular?

A. Certainly. This is in a discussion of obviousness combination of Jeon and Xiong, and so the sentence in question is: In other words, Jeon in view of Xiong teaches an apparatus configured to enable or disable each amplifier stage independently of whether or not any other amplifier stage is enabled or disabled.

(INTEL Exhibit 1003 marked for identification.)

Q. Handing you what has been marked as Exhibit INTEL 1003, and you recognize Exhibit INTEL 1003 as U.S. Patent Application Publication Number US 2011/0217945?

A. Yes. This is the patent application you cited by Uehara.

Q. And you refer to the Exhibit INTEL 1003 as Uehara, correct?

A. Sure. I would recognize it by that name.

Q. I direct your attention to Figure 2A of Uehara. In Figure 2A of Uehara, transistors 203 and 204 receive differential input signals, VN+ and VN- respectively, correct?

A. I want to make sure I caught your entire question. Could you please repeat it?

Q. Sure. Transistors 203 and 204 receive differential input signals VN+ and VN- respectively?

A. Yes, that's correct.

Q. What's your understanding of a differential signal?

A. A differential signal is one in which the signal is encoded in the voltage difference between the two nodes, so the difference between VN+ and VN- is the signal.

Q. And in Figure 2A of Uehara, voltage VNAux, V N A U X, turns on four transistors: 209, 210, 211, and 212, correct?

MR. FERNANDEZ: Objection. Form.

A. In the specific embodiment depicted in Figure 2A of Uehara, the signal VNAux is supplied to the gates of transistors 209, 211, 210, and 212 and controls the gate voltage on

those four transistors.

Q. And when the gate voltage VNAux is sufficient to 209, 210, 211, and 212, current is enabled at both output ports, OUT1 and OUT2, correct?

MR. FERNANDEZ: Objection. Form.

A. Could you please repeat the question?

Q. The gate voltage VNAux may be used to enable the transistors 209, 210, 211, and 212 such that current is provided at output ports OUT1 and OUT2?

A. In some scenarios that might be true, but not in all cases.

Q. Can you elaborate on which scenarios that is correct and which scenarios it's not?

A. Yes, yes, I can.

Q. Would you, please?

A. The patent describes the transistors 209 through 212 as coupling the transconductance stages made up of -- the transconductance stage made of transistors 203 and 204 to output paths 1 and 2. So in the case where the transconductance stage is

providing current, the VNAux controls whether that current is coupled to those output paths or not.

Q. Thank you.

And there's another pair of transistors 201 and 202 that also receive differential input signal VN+ and VN- respectively, correct?

A. In Figure 2A of Uehara, transistor 201 and transistor 202 receive the same VN+ and VN- as transistors 203 and 204 do.

Q. And a voltage VN1 determines whether current from 201 and 202 is coupled to OUT1?

MR. FERNANDEZ: Objection. Form.

A. Could you repeat your question for me, please?

Q. In Figure 2 of Uehara, a voltage VN1 determines whether current from 201 and 202 is coupled to output OUT1?

MR. FERNANDEZ: Objection to form.

Q. Is that right?

A. In Figure 2A, signal VN1 allows cascode transistors 205 and 207 to be selectively turned on or off thereby coupling

or decoupling current from transistors 201 and 202 from output path OUT1. I have that in Paragraph 86 of my declaration 00047. It's also found in Paragraph 36 of the Uehara patent application.

Q. Just to correct the spelling here, get the spelling right from your statement, you said signal VN1 allows cascode transistors 205 and 207?

A. Cascode transistors 205 and 207.

Q. Are you looking at your declaration Exhibit INTEL 1002?

A. Yes.

Q. And on Page 51, I think it's about where you were, you've illustrated Uehara Figure 2A. Are you with me?

A. Yes. Page 51 has an annotated version of Uehara's Figure 2A.

Q. In that figure, you've identified input transistors 201 and 202 as forming part of a first amplifier stage, correct?

A. Yes. As I discuss in Paragraphs 81 and 82 of my declaration, the 00047 declaration, transistors 201 and 202 make up

one transconductance stage which forms one-half of the first amplifier stage.

Q. And when enabled, that first amplifier stage provides an output signal to OUT1?

A. Could you please repeat the question?

Q. And when the first amplifier stage is enabled, it provides an output signal to OUT1?

MR. FERNANDEZ: Objection. Form.

A. When the first amplifier stage that I've identified as consisting of transistors 201, 202, 205, and 207 are enabled, it provides -- it couples currents to the output path labeled OUT1, which is thereby providing an output to the output path OUT1.

Q. And the output signal OUT1 is a differential signal?

A. In the embodiment shown in Figure 2A, the signal at output path 1 is a differential signal.

Q. And on Page 60 of Exhibit INTEL 1002, same document, you've annotated Uehara

Figure 2A is illustrate a second amplifier stage, correct?

A. Yes. On Page 60 of my 00047 declaration, I show the second amplifier stage consisting of transistors 203, 204, 210, and 212, as annotated in that figure.

Q. And voltage VNAux determines whether current from the second amplifier stage is coupled to output paths OUT1 and OUT2, correct?

MR. FERNANDEZ: Objection. Form.

A. No, that's not correct.

Q. How is the second amplifier stage enabled in Figure 2A?

A. The second amplifier stage in 2A, as I've annotated it, is controlled by the VNAux signal applied to the gates of transistors 210 and 212.

Q. And when VNAux is applied to the gates of transistors 210 and 212, current is coupled to output path OUT2, correct?

A. Could you repeat it for me? Sorry.

Q. And when the VNAux signal is applied to the gates of transistors 210 and 212, current is coupled to output path OUT2?

A. When a sufficiently high voltage is applied to VNAux, the transistors 210 and 212 couple current from the transconductance stage made up of transistors 203 and 204 to output path OUT2.

Q. In Paragraph 39 of Uehara, Uehara states, and I will read it: Specifically, transconductance stage transistors 201-202 may be configured to couple current to both output paths OUT1 and OUT2 by providing VN1 and VN2 to turn on transistors 205-208.

Did I read that correctly?

A. Yes, you did.

Q. And you agree with that?

A. In the context of the specification, he's describing a particular embodiment. And in the particular embodiment that this appears, that sentence appears within the narrative of, yes, I agree with that statement.

Q. And continuing: In this configuration, VNAux is provided to turn on transistors 209-212 so that transconductance stage transistors 203-204 provide current to both output paths OUT1 and OUT2.

Did I read that correctly?

A. Yes, you read that correctly.

Q. And you agree that that's what Uehara discloses?

A. That's what he says here in this particular embodiment that he's describing.

Q. With respect to the embodiment shown in Figure 2A, does Uehara disclose that VNAux is provided to turn on transistors such that current is provided to only one of the output ports?

MR. FERNANDEZ: Objection. Form.

Q. And if so, can you point me to that disclosure?

MR. FERNANDEZ: Same objection.

A. Can you restate your question for me or just repeat it?

Q. Sure. And I'll set the stage again.

I'm focused on that second sentence of Paragraph 39 where it says: VNAux is provided to turn on transistors such that current is provided to both output ports. And my question is: Does Uehara disclose an embodiment where VNAux turns on transistors

such that current is provided to only one of the output ports, not both?

MR. FERNANDEZ: Objection. Form.

A. Uehara discloses embodiments where current is coupled to only one of the output ports, just not with respect to VNAux.

Q. So with respect to transconductance stage transistors 203 and 204, Uehara only discloses providing current to both output ports, OUT1 and OUT2, via VNAux?

MR. FERNANDEZ: Objection. Form.

A. With respect to the specific embodiment shown in Figure 2A, the second GM stage, which is made up of transistors 203 and 204, are shown coupled through the transistors controlled by VNAux 209 through 212 to be coupled to both out ports 1 and -- output paths OUT1 and OUT2. However, Uehara discloses elsewhere in the specification alternative embodiments where that's not the case.

Q. Where are you reading from your declaration?

A. I was summarizing my declaration, but this -- the discussion appears in

Paragraphs 93 through 98.

Q. And where in Paragraphs 93 through 98, do you discuss alternative embodiments where that's not the case?

A. Footnote 21 on Page 62.

Q. Specifically with respect to the embodiment disclosed in Figure 2A in Uehara, and I'm referring to Paragraph 39, Uehara discloses that in Figure 2A, the embodiment of 2A, when the first amplifier stage is coupled to both outputs, OUT1 and OUT2, the second amplifier stage is also coupled to both outputs, OUT1 and OUT2, correct?

MR. FERNANDEZ: Objection. Form.

A. You appear to have paraphrased Paragraph 39.

Q. Did I paraphrase it correctly? Did I summarize it correctly? Would you like to summarize it differently?

MR. FERNANDEZ: Objection. Form.

A. I'm a little bit more comfortable if we stick with the exact language in Paragraph 39.

Q. And with respect to the embodiment

disclosed in Figure 2A in Uehara, Uehara only discloses transistors 203 and 204 providing current to both outputs, OUT1 and OUT2, when enabled by VNAux?

MR. FERNANDEZ: Objection. Form.

A. For the particular embodiment described -- shown in Figure 2A, transconductance Stage 2, which is made up of transistors 203 and 204, are -- coupled current to both outputs, OUT1 and OUT2, under the control of VNA Aux -- VNAux, sorry.

Q. And if you advance to the next paragraph, Paragraph 40, in the -- this is in the context of Figure 2A also, Uehara discloses that when only one output path, OUT1 or OUT2, is coupled to the transconductance stage transistors 201 and 202 -- I believe this is a typo. It says NVAux, but I believe that to refer to VNAux -- VNAux is configured to turn off transistors 209 to 212 to decouple current from transconductance transistors 203 and 204 from output paths OUT1 and OUT2, correct?

MR. FERNANDEZ: Objection. Form.

A. Paragraph 40 describes a mode in

which only a single output is provided, OUT1 or OUT2. And in the particular embodiment shown in Figure 2A, Uehara achieves that by coupling current from transistors 201 and 202 to either one of output path OUT1 or OUT2, e.g., but not both.

Q. And in that mode that you just described, transistors 203 and 204 are decoupled from output paths OUT1 and OUT2?

A. Yes, that is correct. For that particular embodiment.

Q. And that's the embodiment of Figure 2A?

MR. FERNANDEZ: Objection. Form.

A. That is one use case for the embodiment in Figure 2A.

Q. That's the only use case Uehara discloses with respect to Figure 2A, correct?

A. I -- I disagree with that a little bit.

Q. And where in Uehara can you point me to, Uehara's disclosure with respect to Figure 2A, of a different mode of operation?

MR. FERNANDEZ: Objection. Form.

A. Uehara seeks to address a problem that he lays out in the background section. His alleged problem that he's solving is inconsistent characteristics of amplifiers when the loading conditions change. And he describes in Paragraph 33 how by incorporating one or more additional GM stages when driving multiple output paths, the performance of amplifier circuit 100 may be maintained across different output loads.

One might well -- there are -- since there are cases where one wants consistent amplifier performance, one might also want different amplifier performance. And in that case, the embodiment of Figure 2A might well be used in a manner different than described in the very specific use case he outlines in the Paragraphs 38 through 40 that we discussed earlier.

Q. But Paragraphs 38 through 40, Paragraphs 38 through 40 are the only use case he outlines with respect to the embodiment of Figure 2A, right?

MR. FERNANDEZ: Objection. Form.

A. I -- I don't fully agree with your statement.

Q. Can you show me where with respect to the embodiment of Figure 2A you disagree in Uehara?

A. Sure. In Paragraph 47, describing Figure 3, he --

Q. No, no, with respect to Figure 2A.

A. Figure 3, the discussion in Paragraph 47 provides a discussion and it says -- it gives me a current combiner circuit that operate as described above, which I take to mean encompassing Figure 2 and Figure 1.

MR. RITCHIE: Let's take a break.

THE WITNESS: Okay. Thank you.

(A short break was taken.)

(INTEL Exhibit 1106 marked for identification.)

Q. Handing you what has been marked as Exhibit INTEL 1106, do you recognize Exhibit INTEL 1106 as U.S. Patent Application Publication Number US 2010/0237947?

A. Yes, I recognize this Exhibit INTEL 1106 as the patent application you cited.

Q. And in your declaration, you referred to this as Xiong, X I O N G?

A. Yes, I do.

Q. I'd like to direct your attention to the embodiment disclosed in Figure 3 of Xiong. Are you there?

A. Yes, I am. Yes, I'm here.

Q. And at a high level, Xiong's Figure 3 illustrates an amplifier, correct?

MR. FERNANDEZ: Objection. Form.

A. Yes, Xiong describes Figure 3 as -- Figure 3 illustrates an implementation 300 of a low noise amplifier, LNA, as I describe it more fully.

Q. And Xiong goes on to describe that the amplifier can operate in two gain modes, HL mode and an LN mode, correct?

A. Yes. The discussion surrounding Figure 3 indicates that that figure operates in two gain modes, an HL mode and an LN mode.

Q. If we look at Figure 3, we can see HL refers to high linearity, and LN refers to low noise?

A. That's my understanding of his

abbreviations, yes.

Q. Now, again, still looking at Figure 3 of Xiong, the input to the amplifier is a differential signal?

A. Yes. The amplifier in Figure 3 operates on a differential input signal.

Q. And the output from the amplifier is also a differential signal, correct? And it's identified as going to loads 310 and 311?

MR. FERNANDEZ: Objection. Form.

A. I don't see that Xiong specifically identifies the output signal as being differential.

Q. You agree the input is differential signal?

A. The input is a differential signal per the discussion in Paragraph 25 of Xiong.

Q. Is it your understanding that the -- based on the illustration in Figure 3 that the output is a differential signal as well?

A. The specific embodiment shown in Figure 3 appears to be a differential configuration, and so the output could be a differential signal.

Q. And I'm referring to Exhibit INTEL 1102, your declaration. On Page 49, you identified gain path 301 as a first amplifier stage, correct?

MR. FERNANDEZ: Objection. Form.

A. In Paragraphs 81 through roughly -- and 82 of my declaration, 00048, I describe how Xiong, how the annotated version on Page 49 shows a first amplifier stage in Xiong.

Q. And that first amplifier stage is the element that's identified as gain path 301 in Figure 3?

A. The -- yes, what I identify as the first amplifier stage in Xiong is the gain path 301 in Figure 3.

Q. And in Figure 3, the differential input signal is coupled to the first amplifier stage?

A. I'm sorry. I missed your question. Could you please repeat it?

Q. In Figure 3, the differential input signal is coupled to the first amplifier stage?

A. Yes. In Figure 3, the first amplifier stage is coupled to -- or the input

RF signal is coupled to the first amplifier stage.

Q. The differential input RF signal is coupled to the first amplifier stage?

A. The -- yes. The input RF signal is differential, and it's coupled to the first amplifier stage.

Q. And when it is enabled, the first amplifier stage outputs a signal to loads 310 and 311?

A. Yes.

MR. FERNANDEZ: Objection. Form.

A. When enabled, the first amplifier stage provides an output to loads 310 and 311.

Q. And on Page 63, you identify gain path 302 of Figure 3 as a second amplifier stage?

A. Yes. On Page 63, the annotated version of Figure 3 that I supply, as well as the text in Paragraphs 95 and 96 describe how what Xiong calls 302 in Figure 3 is a second -- a second amplifier stage.

Q. And a differential input RF signal is coupled to the second amplifier stage?

A. The input RF signal, which is differential, is coupled to the second input -- second amplifier stage.

Q. And when enabled, the second amplifier stage of Xiong outputs a signal to loads 310 and 311?

MR. FERNANDEZ: Objection to form.

A. Can you repeat your question for me, please?

Q. The second amplifier stage of Xiong, outputs a signal to loads 310 and 311 when it's enabled?

MR. FERNANDEZ: Object to form.

A. I don't say that explicitly in my declaration, no.

Q. Does the second amplifier stage of Xiong Figure 3 amplify a signal?

A. Xiong Figure 3, it can under the right conditions.

Q. When it's enabled, the second amplifier stage amplifies a signal?

A. When the second amplifier stage is enabled, it provided that that gain path is on and it amplifies the signal.

Q. And where is that amplified signal from the second amplifier stage shown on Figure 3?

A. The output, the output is at the terminals just below loads 310 and 311, the little dots there.

Q. And the amplified signal from the first amplifier stage in Xiong Figure 3 also appears at the little dots just below loads 310 and 311, correct?

MR. FERNANDEZ: Objection. Form.

A. There's no distinction in Xiong with respect to the output of the first or the second amplifier stages in Xiong.

Q. Can you clarify? What do you mean by "no distinction"?

A. There is one output in the Figure 3 of Xiong, so there is not an output from amplifier stage 1 that is distinct from the outputs of amplifier stage 2.

Q. You can set that aside.

(INTEL Exhibit 1004 marked for identification.)

Q. Handing you what has been marked as

Exhibit INTEL 1004, do you recognize exhibit INTEL 1004 as the document titled: 3GPP TR 36.912 Version 9.1.0, parentheses, 2009-12, end parentheses?

A. Yes, I recognize this document as the one you cited earlier.

Q. And in your declarations, you refer to Exhibit INTEL 1004 as the Feasibility Study?

A. Yes, that's a shorthand value.

Q. Now, the acronym 3GPP is sometimes used to refer to the Third Generation Partnership Project?

A. That's what I know 3GPP to mean.

Q. And 3GPP is the standard -- is a standards organization, generally, correct?

A. Yes, it is.

Q. And 3GPP is the standards organization that promulgated the Feasibility Study?

A. Yes, that's my understanding.

Q. Were you an author of the 3GPP Feasibility Study?

A. No, I am not.

Q. Did you participate in the 3GPP

Feasibility Study?

A. No, I did not.

Q. The title of this document refers to LTE Advanced. Did you participate in any of the 3GPP proceedings with respect to LTE Advanced?

A. I'm sorry. You got a little garbled. Could you repeat it for me?

Q. Did you participate in any 3GPP proceedings with respect to LTE Advanced?

A. No, I did not.

Q. Are you familiar with 3GPP?

A. I am.

Q. 3GPP doesn't develop Wi-Fi standards, correct?

A. To the best of my recollection, that's a different group.

Q. My understanding is IEEE is the standards organization that oversees the Wi-Fi standards?

A. I know that was true originally. I'm not sure if it's true anymore.

Q. 3GPP doesn't develop Bluetooth standards, correct?

A. My understanding is that Bluetooth standards are developed by another group.

Q. According to the title page, the Feasibility Study is related to -- it's a Feasibility Study for further advancements for E-UTRA LTE Advanced, correct?

A. Yes, it is a Feasibility Study for further advancements for E-UTRA, parentheses, LTE-Advanced, close parentheses.

Q. What does E-UTRA stand for?

A. E-UTRA stands for Evolved Universal Terrestrial Radio Access.

Q. And 3GPP uses the acronym E-UTRA to refer to standard specifications for LTE, correct?

MR. FERNANDEZ: Objection. Form.

A. I don't think I understand your question. I'm sorry.

Q. 3GPP develops standards for LTE communications?

A. Yes, they do.

Q. And the acronym E-UTRA is used in connection with 3GPP's LTE standards, correct?

A. The acronym E-UTRA is one of many

acronyms that are used in conjunction with this standards development effort, yes.

Q. And specifically with respect to LTE?

MR. FERNANDEZ: Objection. Form.

A. My understanding is that the acronym E-UTRA refers to specific aspects of the LTE Advanced.

Q. Now, the Feasibility Study does not pertain to Wi-Fi, does it?

MR. FERNANDEZ: Objection. Form.

A. The 3GPP Feasibility Study that we're referring to here does not relate directly to Wi-Fi, no.

Q. And the 3GPP Feasibility Study that we're referring to here does not relate to Bluetooth either, does it?

MR. FERNANDEZ: Objection. Form.

A. The 3GPP Feasibility Study Intel -- Exhibit INTEL 1004 does not describe Bluetooth operation.

Q. It's your testimony that carrier aggregation means simultaneous operation on multiple carriers, correct?

A. It's my opinion that in the context of the analyses I did, that carrier aggregation within the context of the '356 Patent means simultaneous operation on multiple carriers, which is how the author of the '356 Patent describes it.

Q. And just so I can get -- sync up with you, which document are you looking at?

A. I picked the IPR-00048. In that particular one, it's Paragraph 61.

Q. And that's Exhibit INTEL 1102?

A. Yes.

Q. And continuing on in Exhibit INTEL 1102, in Paragraph 62 you also said that carrier aggregation means sending data to or from radio on multiple carriers at the same time.

A. Paragraph 62 describes how a person of skill in the art would understand those statements to mean that -- or the construction I describe in Paragraph 61 is consistent with the understanding of persons having ordinary skill in the art as described above. Carrier aggregation is commonly understood to mean

sending data to or from a radio on multiple carriers at the same time.

Q. And what is the basis for your opinion that that is how carrier aggregation is commonly understood?

MR. FERNANDEZ: Objection. Form.

A. It's my opinion that that is how this is commonly understood.

Q. And what's the basis for that?

A. A person of ordinary skill in the art working on receivers for wireless devices understands that carrier aggregation as defined to mean simultaneous operation on multiple carriers. It's just a restatement of the same definition.

Q. And so going back to Paragraph 61, what is the basis for your understanding that carrier aggregation means simultaneous operation on multiple carriers in the context of the '356 Patent?

A. That is how the '356 Patent describes it explicitly. The author of the '356 Patent uses the phrase "simultaneous operation on multiple carriers." I can show

you the citations. They're all given here in Paragraph 61.

Q. Do you have any other basis for your opinion that that's how the term "carrier aggregation" should be understood in the context of the '356 Patent?

MR. FERNANDEZ: Objection. Form.

A. My understanding is that in a patent, when -- the author is free to define their own terms, be their own lexicographer, and they have clearly defined the term in the specification.

Q. And in Paragraph 61, you've cited I think four, four examples to support your opinion; is that right? Did I count right?

MR. FERNANDEZ: Objection. Form.

A. No, there are -- I cite six, and there are some more. Oh, excuse me. One of the citations -- no, that's right.

Q. Can you walk me through the six in Paragraph 61?

A. Yes. There is the column 20 at row 49.

Q. I see. I'm with you now. I

understand.

A. Okay.

Q. I understand. I see.

So yes. So you've identified six citations in Paragraph 61 to support your opinion that carrier aggregation in the '356 Patent means simultaneous operation on multiple carriers?

A. Yes, and there are actually more in the document.

Q. And these six citations, plus the additional ones that you can identify in the document are the basis for your opinion carrier aggregation in the '356 Patent means simultaneous operation on multiple carriers?

MR. FERNANDEZ: Objection to form.

A. These citations show me that the author of the '356 Patent meant simultaneous operation on multiple carriers through their definitions. And a person of ordinary skill in the art would also understand it's consistent with a person of ordinary skill of the art's understanding of carrier aggregation. Those are the bases.

Q. It may be in this one, but I've got the cites for another one. Would you turn to Exhibit INTEL 1302 and direct your attention to Paragraph 81 of INTEL 1302.

A. Yes.

Q. And in the last sentence of Paragraph 81, you said and I'll quote: For example, receiving data over two 20-megahertz carriers increases bandwidth to 40 megahertz as shown in Figure 10 below.

A. That's the next-to-last sentence of Paragraph 81.

Q. Fair enough. You're correct.

What is the basis for your opinion that receiving data over two 20-megahertz carriers increases bandwidth to 40 megahertz?

A. Figure 10 is an annotated version of Figure 7 earlier in my declaration showing two component carriers, in this case illustrated as No. 2 and No. 3 highlighted in green, each having a bandwidth of 20 megahertz. So under simultaneous operation, simultaneous operation on multiple carriers, CC No. 2 provides 20 megahertz of bandwidth. CC No. 3 provides

20 megahertz of band. So simultaneously operating on CC No. 2 and CC No. 3 gives me a total of 40 megahertz of bandwidth.

The patent further specifies that a carrier is a -- I'm sure it's here. Within the specification, the patent defines a carrier may refer to a range of frequencies used for communication. So it's showing each of these carriers has a bandwidth.

Q. What do you mean by two 20-megahertz carriers increases bandwidth? Increases it from what?

MR. FERNANDEZ: Objection to form.

A. If one were receiving data on only one carrier, the bandwidth in this example, just as illustrative example in Figure 10, the bandwidth of each carrier is shown as 20 megahertz. So operation on one carrier would give you 20 megahertz of bandwidth. Operating on two would give you 40 megahertz of bandwidth.

Q. So two is an increase over one?

A. Yes.

Q. In Paragraph 83 of INTEL 1302, in

the last sentence you stated: Lee uses multiple carriers to send different data, not redundant data.

What is the basis for your opinion that Lee discloses sending different data, not redundant data?

A. That, what you quoted is an excerpt from the last sentence on Paragraph 83. Lee discloses simultaneous operation of a Wi-Fi connection and a Bluetooth connection in the same receiver and does not in any way suggest that the data transmitted by the -- on the Wi-Fi signal is related to the data transmitted on the Bluetooth signal. That's very different from Hirose, which is the part of the sentence you omitted, where it was explicitly indicated that the data on multiple carriers was redundant.

Q. You said Lee does not in any way suggest that the data transmitted on a Wi-Fi signal is related to the data transmitted on a Bluetooth signal, correct?

A. I'm not sure if that's exactly what I said or not.

Q. Is that correct with what you were intending to say?

MR. FERNANDEZ: Objection. Form.

A. Perhaps "related" maybe is not quite the right word I should use. There is no indication in Lee that the data transmitted by the Wi-Fi signal and the data transmitted by the Bluetooth signal are redundant.

Q. Is there any indication in Lee that the data transmitted by the Wi-Fi signal and the data transmitted by the Bluetooth signal are different?

A. Lee does not expressly disclose that. But a person of ordinary skill in the art would understand that they would almost certainly have to be different. Performance characteristics of Wi-Fi and Bluetooth are so different that it would be -- it wouldn't make sense to try to send the redundant data that way.

Q. In that same paragraph, Paragraph 83 of INTEL 1302, about the fifth line down, you said, and I quote: Receiving data on two or more carriers carrying non-redundant data

simultaneously increases the data rate to the sum of the two carriers' data rates.

Did I read that correctly?

A. Yes, you did.

Q. What is the basis for your statement?

MR. FERNANDEZ: Objection to form.

Q. What is the basis for that statement?

A. This statement is just a statement of how -- this is just a statement about how data rates work when you have more than one data stream at a time. There's an illustrative example in the next sentence that perhaps may help. For example, if the first carrier transmits data at 50 megabits per second and the second carrier transmits data at 25 megabits per second, transmitting data over both of those carriers at the same time increases the aggregated data rate to 75 megabits per second.

Q. So in that example, the data rate of the first carrier is 50 megabits per second?

A. The data rate associated with the

first carrier's transmission, yes.

Q. And the data rate associated with the second carrier's transmission is 25 megabits per second?

A. In this illustrative example, yes.

Q. In that example, it's your opinion that the aggregated data rate associated with those transmissions is 75 megabits per second, correct?

A. Yes, that's right.

Q. Does that assume that the two carriers are sending non-redundant data?

MR. FERNANDEZ: Objection. Form.

A. Yes, it does.

Q. So let's change your example. So let's assume in your example that the second carrier, excuse me, is transmitting redundant data. So we have a data rate of a first carrier, 50 megabits per second.

Are you with me?

A. Yes.

Q. We have a data rate of a second carrier of 25 megabits per second, and it's sending redundant data.

Are you with me?

A. Yes.

Q. What is the aggregated data rate in that example?

A. That example is a little bit difficult because the redundancy is not entirely well defined. If the redundancy is intended to be a hundred percent redundant, then the data rate of the overall channel has to be the smaller of the two.

Q. So in my hypothetical, if the redundancy was a hundred percent, the aggregated data rate would be 50 megabits per second?

A. No. In your example, your second channel was transmitting at 25 megabits per second. If the same amount of data is in that stream as was in the first carrier, then the -- and they are fully redundant, then the data rate going into the wireless device under that hypothetical scenario is 25 megabits per second.

Q. So in your opinion, an aggregated data rate is dependent on the type of data that

is being transmitted over the two carriers?

MR. FERNANDEZ: Object to the form.

A. In my opinion -- I'm sorry. Actually I need you to say the question again to make sure I got it.

Q. In your opinion, an aggregated data rate is dependent on the type of data that is being transmitted over the two carriers?

MR. FERNANDEZ: Same objection.

A. I think type of data is too vague and doesn't capture my opinion.

Q. In your opinion -- let me try again.

In your opinion, an aggregated data rate is dependent on whether the data being transmitted over the two carriers is redundant or not redundant?

MR. FERNANDEZ: Object to the form.

A. In my opinion, redundancy of the data is one factor that might -- that might influence the aggregated data rate.

Q. You said "might influence." Does it definitely influence it? If redundant data is being transmitted, is an aggregated data rate over two carriers different than when not --

sorry. Let me start over.

Is an aggregated data rate dependent on whether different data or redundant data is being transmitted over the multiple carriers?

MR. FERNANDEZ: Objection to form.

A. I'm not sure what you mean by "different data."

Q. So in Paragraph 83, for example, you refer to Lee as sending different data, not redundant data. Do you have an understanding of what different data and redundant mean in that context?

A. In this context, yes, I do.

Q. And what is your understanding of different data and redundant data in that context?

A. In that particular sentence that we're pointed at now in Paragraph 83, I use different data simply to mean not redundant data.

Q. Okay. And so now back to our discussion of aggregated data rates. In your opinion, is an aggregated data rate dependent on whether different data or redundant data is

being transmitted over the two carriers?

MR. FERNANDEZ: Objection to form.

A. I haven't offered an opinion on that. And I would need to think about it a little bit more because there are a number of other things that might also factor into it, and I want to be accurate.

Q. So in Paragraph 83 in your example, back to your example, where you had two carriers transmitting at 50 and 25, and you concluded that they produced an aggregated data rate of 75 megabits per second, are you saying that that opinion would not hold in the event that those carriers were transmitting redundant data?

MR. FERNANDEZ: Objection. Form.

A. One would have to -- the details matter. Under some conditions, that simple addition that I describe would not necessarily hold up if the data as carried by the first carrier and carried by the second carrier were redundant in some way.

I note, though, that in the sentence right before that example, I explicitly mention

that those carriers carry non-redundant data.

Q. You would agree that a large data file, for example, could be transmitted more quickly using two aggregated carriers than just one carrier, correct?

MR. FERNANDEZ: Objection. Form.

A. In a hypothetical -- under some circumstances, wireless transmission of a large file simultaneously over multiple carriers could proceed more quickly than if one used a single carrier.

Q. And why would the transmission of a large file proceed more quickly over multiple carriers than if just one was used?

A. Could you repeat your question for me?

Q. Why would the transmission of a large file proceed more quickly over multiple carriers than if just a single carrier was used?

A. Perhaps Paragraph 40 of my declaration, this is in Exhibit INTEL 1302, would help. In Paragraph 40, I note that increasing download speeds is one of many uses

of carrier aggregation.

Q. So how -- is that your answer?

A. Yes, the increased download speed is one of many uses of carrier aggregation.

Q. How does the simultaneous operation on multiple carriers increase the download speed?

A. Just as in the example that we were discussing earlier at Paragraph 83, by using two carriers, you increase the data rate -- at least in the use case we're talking about for downloads, increasing download speed, you increase the data rate to the sum of the data rates associated with each carrier.

Q. So for the use case we're talking about, a large data file, part of the data file would be sent down one carrier and part of the data file would be sent down the other carrier; is that correct?

A. That's one of a number of possibilities.

Q. What are other possibilities?

MR. FERNANDEZ: Objection to form.

A. One other possibility would be that,

for example, every other word could be sent on the different carriers or, I mean, there's a bunch of ways that you could imagine, imagine how that might work.

Q. But whether it's one word alternating or multiple words alternating or however that happened, part of that data that was at the transmitter would go down one carrier and another part of that data would go down another carrier?

MR. FERNANDEZ: Objection. Form.

A. That's one way. There are other ways where the data gets more intertwined.

Q. I don't understand.

A. I'm trying to think how I can explain it.

Q. Can you explain it in the context of your example of 50 megabits on one carrier and 25 on another?

A. Yes. Well, from the standpoint of just adding up the data rates, I have a larger -- it's equivalent to an analogy that maybe people use is a pipe and I can put data in the pipe. And if the pipe is bigger, I can

put more data through it, you know, in a given unit of time.

Q. So the two carrier -- so the two carriers provide a pipe, a bigger pipe from the transmitter to the receiver?

MR. FERNANDEZ: Objection. Form.

A. This is a very crude simplistic analogy, but it just gets at the summation of data rates that that example in Paragraph 83 describes.

Q. Carrier aggregation provides a combined higher bandwidth channel for communication, right?

MR. FERNANDEZ: Objection. Form.

A. That is one of several use cases for carrier aggregation.

Q. In carrier aggregation, multiple carriers are combined?

MR. FERNANDEZ: Objection. Form.

A. I don't know the question.

Q. Do you agree that in carrier aggregation, multiple carriers are combined?

MR. FERNANDEZ: Objection. Form.

Q. Do you agree that carrier

aggregation means that multiple carriers are combined?

MR. FERNANDEZ: Objection. Form.

A. No, I do not. No, I do not.

Q. And what do you disagree with in that statement?

A. As defined in the '356 Patent and consistent with the understanding of a person of ordinary skill in the art, carrier aggregation is simultaneous operation on multiple carriers. It doesn't imply any particular combination or specific use case.

Q. Do you agree that combining those multiple carriers and aggregations is how download speeds are increased?

MR. FERNANDEZ: Objection. Form.

A. That's -- the carriers are never combined.

Q. What's combined?

MR. FERNANDEZ: Objection. Form.

A. In the case -- in the use case of increased download speeds, the data is combined.

Q. In the use case of increased

download speeds, where is the data combined?

MR. FERNANDEZ: Objection. Form.

A. My understanding is that the data is combined in the baseband processor after the RF channel.

Q. And to clarify that further, the data that is combined is the data from the two carriers?

MR. FERNANDEZ: Objection. Form.

A. In the specific case of using carrier aggregation to increase download speeds where a single file is transmitted, that data is -- the data received on each carrier is used to reconstruct the file much further down in the signal processing chain than the RF signal path.

Q. Would you agree that carrier aggregation acts to combine carriers as a single virtual channel?

MR. FERNANDEZ: Object to form.

A. No, I wouldn't agree with that statement. That does not embody the multiple use cases for carrier aggregation.

Q. And why don't you agree with that

statement?

A. In my declaration of INTEL 1302, in Paragraph 40, I delineate a number of other use cases for carrier aggregation that are known by people of state-of-the-art -- persons of ordinary skill in the art that -- for which that characterization would be inaccurate or incomplete.

Q. Would you agree that carrier aggregation serves to provide a higher bandwidth channel?

MR. FERNANDEZ: Objection. Form.

A. That is one of the use cases for carrier aggregation, but it does not capture the full meaning of carrier aggregation.

Would it be possible to take a short break?

MR. RITCHIE: Absolutely.

Absolutely.

(A short break was taken.)

(Qualcomm Exhibit 2013 marked for identification.)

Q. Handing you what has been marked as Exhibit Qualcomm 2013, Page 1 identifies

Qualcomm 2013 as U.S. Patent 9,161,254. Do you see that?

A. Yes, I see that.

Q. And you can take a moment to get familiar with this, if you like. But I want to direct your attention specifically to a passage in column 3 of the specification.

MR. FERNANDEZ: Objection. Relevance.

Q. Just tell me when you're ready.

A. Where was the reference you wanted me to look at?

Q. I'll read it to you. It starts at Line 19.

A. I'm not sure what column you're on.

Q. I'm sorry, column 3.

A. I need to catch up, though.

Q. Okay.

(Witness reading document.)

A. So I've scanned this. It's quite detailed. If you have a question, I'll try to answer it.

Q. So at column 3, Line 19, let me know when you're there.

A. Yes, I'm there.

Q. And at column 3, beginning at Line 19, Qualcomm -- Exhibit Qualcomm 2013 states, and I'll read: One technique for providing additional bandwidth capacity to wireless devices is through the use carrier aggregation of multiple smaller bandwidths to form a virtual wide band channel at a wireless device, parentheses, e.g., UE, end parentheses.

Did I read that sentence correctly?

MR. FERNANDEZ: Objection. Relevance.

Counsel, I'd like to establish a standing relevance objection to any questions about Qualcomm Exhibit 2013.

MR. RITCHIE: Noted.

A. You read that sentence correctly.

Q. Do you agree with that sentence?

A. There's a grammar error which impairs full understanding of what they mean. It muddles it a bit.

Q. So do you not agree with that statement?

A. The fact that it's grammatically

broken makes it difficult for me to say if I agree or don't agree.

Q. So if we were to read that as -- and insert the word "of" between use and carrier aggregation, so if I read that sentence as: One technique for providing additional bandwidth capacity to wireless devices is through the use of carrier aggregation of multiple smaller bandwidths to form a virtual wideband channel at a wireless device, parentheses, e.g., UE, close parentheses, would you agree with that statement?

A. That -- as I understand it, that statement outlines one possible use case for carrier aggregation.

Q. And so you agree that is a use case for carrier aggregation?

A. Providing -- that sentence indicates that providing additional bandwidth capacity to wireless devices is one use case of carrier aggregation.

Q. And you --

A. And that is consistent with my understanding of one of the use cases for

carrier aggregation.

Q. And you read part of the sentence. But just to be clear, I'm asking you if you agree with the full sentence that it's through the use of carrier aggregation of multiple smaller bandwidths to form a virtual wideband channel of wireless device.

Do you agree with that?

MR. FERNANDEZ: Objection to form.

A. The sentence as you corrected it for grammar and clarity provides us with one possible way in which carrier aggregation could be used in a wireless device.

Q. And I'll go onto the next sentence, and I'll read. It says: In carrier aggregation, parentheses, CA, close parentheses, multiple component carriers, parentheses, CC, close parentheses, can be aggregated and jointly used for transmission to/from a single terminal.

Did I read that correctly?

A. You did read that sentence correctly.

Q. And do you agree with that

statement?

A. This statement outlines one possible way in which carrier aggregation can be used for a wireless device.

Q. I'm going to go on to the next sentence: Carriers can be signals in permitted frequency domains onto which information is placed.

Did I read that sentence correctly?

A. You did read that sentence correctly.

Q. And do you agree with that statement?

A. That use of "carrier" is somewhat different than the use of carrier in -- well, hmm. The use of "carriers" in this sentence seems to be somewhat different than the use in, for example, the '356 Patent. I understand what they mean, but they're defining their terms in a little different way.

Q. What do you understand the sentence "Carriers can be signals and permitted frequency domains onto which information is placed" to mean?

A. That carriers are signals occupying frequency ranges that contain information -- in which information is placed is -- it's a little bit puzzling exactly why they phrased it that way. It's a bit unclear.

Q. Would you have said which information is carried? Is the word "placed" bothering you?

MR. FERNANDEZ: Object to form.

A. It's not -- "placed" isn't the issue. The carrier signal, the structure -- their use of -- their use of "signal" to characterize carrier is not -- is not entirely consistent with the way we used it in other contexts here in our deposition today.

Q. Is there a way that you could reframe that sentence to make it consistent to be a sentence that you would agree with?

MR. FERNANDEZ: Objection. Form.

A. I think the -- I think that the definition provided in the '356 Patent of carrier is more helpful in that it indicates that a carrier is a range of frequencies and, yeah, that's the -- I think that's a clearer

statement.

Q. Okay. Let me go to the next sentence. Qualcomm 2013, beginning at Line 26 states: The amount of information that can be placed on a carrier can be determined by the aggregated carrier's bandwidth in the frequency domain.

Did I read that correctly?

A. You did read that correctly.

Q. And do you agree with that sentence?

A. No, I don't agree with that sentence.

Q. Why don't you agree with that sentence?

A. The sentence tells us about a single -- how much data can be placed on a single carrier, and then goes on to talk about an aggregated carrier's bandwidth. That's -- an aggregated carrier is more than one carrier.

Q. What determines the amount of information that can be placed on a single carrier?

MR. FERNANDEZ: Objection. Form.

A. There are many factors that enter

into how much information can be carried by a single carrier, not just one factor.

Q. Is bandwidth one factor that determines the amount of information that can be placed on a single carrier?

A. Bandwidth is one of the factors that control how much information can be carried by a single carrier.

Q. The sentence refers to an aggregated carrier. What do you understand an aggregated carrier to mean?

MR. FERNANDEZ: Objection. Form.

A. In that sentence, it isn't clear to me what they mean by aggregated carrier.

Q. If we look two sentences above that, the sentence says that multiple component carriers can be aggregated. So do you understand -- with that in mind, do you understand aggregated carrier to refer to multiple component carriers?

MR. FERNANDEZ: Objection. Form.

A. Could you say your question again for me, please?

Q. In the context of that paragraph

that states that multiple component carriers can be aggregated, do you understand the term aggregated carrier to refer to multiple component carriers?

MR. FERNANDEZ: Objection. Form.

A. In this context, it isn't clear -- it isn't entirely clear to me if they mean a single carrier that is among those that have been aggregated or if they are talking about a combination of them.

Q. I'm not sure I understood your answer. I'm sorry.

So were you talking about -- the sentence uses the words carrier, a carrier, and the sentence uses the word aggregated carrier?

A. Yes, I was referring to the phrase aggregated carrier in this sentence in this context. At least as I'm reading this document for the first time, it's not entirely clear to me if they mean a single carrier that has been aggregated or if they are referring to multiple carriers that have been aggregated.

Q. Would it be fair to say that aggregated carriers refers to one or more

carriers?

MR. FERNANDEZ: Object to the form.

A. They have an apostrophe in carriers there which I'm not sure how best to interpret.

Q. So you said before you don't agree with that sentence, and you want to stay with that answer, right? Is that correct, you don't agree with that sentence?

MR. FERNANDEZ: Objection. Form.

A. Can you read back to me exactly what I did say because I have to admit, I don't remember exactly what I said.

Q. You -- I said, Did you agree with that sentence? You said, No, I don't agree with that sentence. And then I said, Why? Do you want me to go on?

A. Yes, please.

Q. You know what? I will just show you right there. That's what you said right there, if you want to clarify what you said.

A. Thank you.

MR. FERNANDEZ: And I'm sorry, Counsel. Is there a question pending?

MR. RITCHIE: The question is, I was

just wanting to check again with Dr. Fay, I had asked him if he had agreed with the sentence that begins at Line 26 of column 3, and he said no. And I wanted to ask him to confirm that he does not agree with that sentence.

A. Yeah, I think that sentence is inaccurate.

Q. Let's move down in column 3 of Exhibit Qualcomm 2013 to Line 45. And the sentence there states: Carrier aggregation, parentheses, CA, enables multiple carrier signals to be simultaneously communicated between a user's wireless device and a node. Did I read that sentence correctly?

A. Yes, you read that sentence correctly.

Q. Do you agree with that sentence?

A. That sentence describes one way in which carrier aggregation can be used.

Q. But you agree with that?

A. I agree that that sentence discloses one way in which carrier aggregation can be used.

Q. And I'm going to skip the next sentence, and I'm going to go to Line 49. At column 3, Line 49, Exhibit Qualcomm 2013 states: Carrier aggregation provides a broader choice to the wireless device enabling more bandwidth to be obtained.

Did I read that sentence correctly?

MR. FERNANDEZ: Objection to form.

A. No, you did not.

Q. Let me try again.

I'm at column 3, Line 49 of Exhibit Qualcomm 2013, and the sentence there begins: Carrier aggregation provides a broader choice to the wireless devices enabling more bandwidth to be obtained.

Did I read that correctly?

A. Yes, you did.

Q. Do you agree with that sentence?

A. That sentence describes one way in which carrier aggregation can be used.

Q. And you agree with that?

A. That sentence discloses one way in which carrier aggregation can be -- can be used.

Q. And I'll go to the next sentence that begins at Line 51 of column 3 in Exhibit Qualcomm 2013, which states: The greater bandwidth can be used to communicate bandwidth-intensive operations such as streaming video or communicating large data files.

Did I read that correctly?

A. Yes, you read that correctly.

Q. And do you agree with that statement?

A. That statement provides sort of an end user perspective on this use case for carrier aggregation that we have been discussing up to now.

Q. And you agree with that?

A. It describes one way in which carrier aggregation can be used.

Q. Dr. Fay, I asked you a number of questions today. Did you provide complete and truthful responses to each of my questions?

A. Yes, I did.

Q. Is there anything further that you would like to clarify or correct any of your

responses?

A. Not that I can think of.

Q. During the breaks today, did you have any discussions with Intel's counsel about the substance of your declarations or your testimony today?

A. No, I did not.

MR. RITCHIE: Subject to any redirect from counsel, I have no further questions.

MR. FERNANDEZ: I have no further questions.

MR. RITCHIE: We're done. We're off the record.

(Witness excused, 1:49.)

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PATRICK FAY, PH.D.

Subscribed and sworn to before me this _____ day of _____ 2019.

_____

Notary Public

P. FAY, PH.D.

C E R T I F I C A T E

STATE OF ILLINOIS)
) ss.:
COUNTY OF COOK)

I, RACHEL F. GARD, CSR, RPR, CLR, CRR, within and for the State of Illinois do hereby certify:

That PATRICK FAY, PH.D., the witness whose deposition is hereinbefore set forth, was duly sworn by me and that such deposition is a true record of the testimony given by such witness.

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

IN WITNESS WHEREOF, I have hereunto set my hand this 9th day of August, 2019.

Rachel F Gard

_____

RACHEL F. GARD, CSR, RPR, CLR, CRR

P. FAY, PH.D.

NAME OF CASE:

DATE OF DEPOSITION:

NAME OF WITNESS:

Reason Codes:

1. To clarify the record.

2. To conform to the facts.

3. To correct transcription errors.

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