Transcript of Michael Allen Jensen, Ph.D.

Date: March 20, 2023
Case: Samsung Electronics Co., Ltd., et al. -v- Smart Mobile Technologies, LLC (PTAB)

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD.

Petitioner,

v.

SMART MOBILE TECHNOLOGIES, LLC

Patent Owner.

Case: IPR2022-01004

U.S. Patent No. 9,614,943

Deposition of MICHAEL ALLEN JENSEN, Ph.D.

Conducted Virtually

Monday, March 20, 2023

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I N D E X

E X H I B I T S

(Not Attached)

MS. REPORTER: Here begins the videoconference deposition of Dr. Michael Jensen in the matter of Samsung Electronics versus Smart Mobile Technologies.

Today's date is March 20, 2023 and the time is 9:32 a.m., Mountain Time.

My name is Stephanie Battaglia of Planet Depos.

Beginning with the noticing party, will counsel please introduce themselves, state whom they represent, and stipulate to the swearing in of the witness remotely.

We will start with Mr. Udick.

MR. UDICK: This is Steve Udick with the firm Skiermont Derby representing Smart Mobile Technologies.

Alongside me is Rex Hwang also of the same firm and Philip Graves with Graves Shaw, LLP, and we so stipulate.

MR. KAZI: This is Aamir Kazi with the law firm of Fish & Richardson here on behalf of the Petitioner Samsung. And also on behalf of the

witness and along with me at this deposition is Mr. Sangki Park also of the same law firm, and we also stipulate.

MICHAEL ALLEN JENSEN, Ph.D.,

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

EXAMINATION

BY MR. UDICK:

Q Good morning, Dr. Jensen.

A Good morning.

Q How are you?

A I am doing well.

Q Great.

A Thank you.

Q We previously had a deposition several months ago, correct?

A That's correct.

Q And we ran through kind of your background and history of how many depos you have had and the ground rules as well.

A Yes, sir.

Q I will just restate some of them.

Let's continue to make sure, as we did I think particularly well in the last deposition, that we try not to speak over each other, especially in this Zoom world where signals can cut when two people speak and the reporter may not be able to hear it and, likewise, head nods and head gestures for answers, the court reporter won't be able to capture that. Does that all make sense?

A Yes.

Q I will do my best to speak slowly so we are not rushing the transcript, and if you will do the same in your answers, I think the court reporter and the record will greatly appreciate that. Is that okay?

A Yes.

Q And then as you noticed from last time occasionally I will ask questions that make no sense to you or you need some further understanding. Will you do me that favor if you don't understand the question ask me for

clarification or to repeat it?

A I will.

Q And if you do answer the question is it okay that I assume that you have understood the question that I have asked you?

A Yes.

Q Just a couple questions for the record that some lawyer made up some time ago and we continue to use it now, is there any reason today that you are unable to give full and complete and honest testimony?

A No.

Q Any medications that would impair your ability to do so?

A No.

Q Great.

This is the petition for U.S. Patent 9,614,943, is that correct?

A That's my understanding as well, yes.

Q And with that petition you provided a supporting declaration, correct?

A That's correct.

MR. UDICK: And just so we have the record clear, Mr. Shanklin, if you could please put Doc 4 into the record.

(Document identified as Exhibit 1003 for identification.)

BY MR. UDICK:

Q Dr. Jensen, last time you had clean copies of the exhibits and the declaration you filed in this case. Is that true today as well?

A Yes.

Q As we did last time if it's okay with you I will mark -- make sure we have on the record that the exhibit is what we are both talking about the same exhibit, but then feel free to use what you have in front of you on your computer soft copy as well, is that okay?

A Yes, that's great.

Q What we have is the Exhibit 1003 of the IPR, which is the declaration of Dr. Michael Allen Jensen.

If the tech can give the witness control and then, Dr. Jensen, if you can quickly scroll to

make sure that what you are looking at here is consistent with what you understand to be your declaration in the IPR.

A Based on my quick scroll through that appears to be my declaration that I submitted.

Q Great.

We can take that down and we can use the one that you have a soft copy.

Dr. Jensen, I will refer to the paragraph numbers, if that's easier for you or if you like I can give you a page number as well as the paragraph as needed.

First I would like to turn to Paragraph 14 -- I am sorry, Paragraph 19.

A Okay.

Q Here you begin an overview of your conclusions formed, is that correct?

A Yes, sir.

Q In 21 you list specific references that you have reviewed in forming the conclusions and the opinions that you have in your declaration, is that correct?

A Yes, that's right.
Q That goes through I guess Page 18?
A Correct. I mean, on my copy here Page 16, you mean the list of references, Page 16?
Q Yes, 16, I am sorry. I was looking at different bullet points that looked like 18, sorry.
A No problem.
Q And then in 22, it is almost a catchall, it is anything else supported in your declaration, is that correct?
A Yes.
Q Are any of these references references that you identified yourself?
A I mean, yes, as I went through definitely several of these references are things that I identified myself.
Q When you say identified yourself, just to make sure we are on the same page, they are references that you researched and found on your own without them previously being provided by counsel, is that correct?

A That's what I meant, yes, sir.
Q Great.
Do you know if -- let me -- if we go to Page 18, 17 and 18, in Paragraph 26 it is a summary of your conclusions, the opinions you formed and your conclusions in this declaration, is that correct?
A That's correct.
Q And there is certain references in those in each of those bullet points, right?
A That's correct.
Q Are any of those references ones that you independently found on your own?
A Those references while I was aware of one of them all of those were identified by counsel and pointed out to me by counsel.
Q Which one were you aware of?
A The Raleigh reference.
Q And how were you aware of Raleigh?
MR. KAZI: Objection to the form.
Sorry, go ahead, Dr. Jensen, objection to form.

THE WITNESS: That's primely in my research area, especially around the time of its disclosure, and so I was aware of what was happening in the industry in these multi antenna space-time encoding kind of systems including the work from Mr. -- Dr. now Raleigh.

BY MR. UDICK:

Q In Paragraph 27 you state your understanding of what the person of ordinary skill in the art is at the time of the invention?

A Yes.

Q And that is they would have a Bachelor's degree in electrical engineering, computer engineering, computer science or related field, and at least two years of experience related to the design or development of wireless communication systems or the equivalent.

You go on, additional graduate education could substitute for professional experience or significant experience in the field could substitute for formal education, correct?

A That's correct.

Q And that is -- in our previous deposition it was on another patent in the same family, the '434 patent, is that correct?

A That's my recollection, the last time you deposed me it was '434.

Q And that was the same definition of a POSITA that you had given in that case, correct?

A That's my recollection, it was the same definition.

Q Nothing would change about how that person of skill in the art, your understanding of what they would be aware of and what their capabilities were at the time, is that correct?

A No, I haven't changed my perspectives on that.

Q If you would turn to -- one of the first references that your opinions relate to is Byrne, is that correct --

A Yes, sir.

Q -- as we march through your declaration?

A That's correct.

Q And if we would, please turn to Page 39,

Paragraph 69.

A Okay, I am there.

Q Does that begin your analysis of Byrne in relation to the claims of the '943 patent?

A Yes.

Q Byrne is another reference we discussed in the '434 deposition, is that correct?

A At this stage I honestly don't recall.

Q If it is you wouldn't -- the record is what it is as to whether that was Byrne, correct?

A Absolutely, yes.

Q I would make the representation that it is, but I understand that you have had I think at least one other deposition in this collective matter so by now there may be some different references in different places and you'd like to be correct with your memory, I assume.

A This is actually my fourth deposition in this family of depositions so, yes, it gets a little jumbled.

Q Totally understand.

MR. UDICK: If you would, Mr. Shanklin, if

we can pull up Doc 8, which is Samsung Exhibit 1008 in the IPR.

(Document identified as Exhibit 1008 for identification.)

BY MR. UDICK:

Q And, Dr. Jensen, like before, take a look and make sure this aligns with your understanding of what the exhibit Byrne is as well as Samsung 1008.

A This is Byrne 1008.

Q Great.

And this is the first -- and we can take that down.

Dr. Jensen, if you would like to look at the soft copy you have on your computer, however you would like to as well. Is that also -- and also, your declaration aside, because I think in some cases you have created some annotated images from Figure 1 that I might ask about.

A Okay, I have them both up.

Q Great.

In addition to the documents -- since you

have submitted your declaration have you reviewed any other documents in preparation for your deposition?

A You mean documents other than what I have talked about in my declaration?

Q Yes.

A No, I don't recall reviewing any other documents. Well -- no, that's not true, I have since filing this declaration I have seen, although not reviewed extensively, the PTAB's institution document as well as I believe in this case also some patent owner preliminary response documents.

Q Yes, and for the record that's correct, we -- Smart Mobile submitted patent owner preliminary response and there was a reply and a surreply and then the institution decision.

A Those are additional documents I did not have at the time of my declaration.

Q Correct.

If we look to Paragraph 87.

A Okay, I am at 87.

Q Just above that is Figure 1 of Exhibit 1008 annotated, correct?
A It's Figure 2.
Q I am sorry?
A Of 1008.
Q Yes.
A Yes.
Q My apologies, correct.
In Figure 2 you have identified -- first, did you create the annotations on this image?
A No. Counsel prepared these annotations.
Q Did you give instruction as to how to make the annotations?
A I gave instruction as to sort of what we were trying to accomplish and we went back and forth on those annotations.
Q Understood.
And here you identify, you have got two -- so there is two -- three colors, a yellow, a blue, and a green, correct?
A That's correct.
Q What is it that you are attempting to show

with yellow?

A The parts or some of the parts of Byrne's disclosure that relate to cordless telephone transceiver and antenna and its communication with the microprocessor.

Q And is it your -- does this annotation indicate that whatever is -- Item 228 is the first thing that's marked in yellow, correct?

A Yes, it's one of the things marked in yellow.

Q And that is an antenna, correct?

A That's correct.

Q And is it your understanding that information is received or transmitted through that antenna?

A Yes. Precisely, a radio signal that contains information, yes.

Q And is it your -- is this annotation indicating that the information or the radio signal -- strike that.

Is this annotation indicating that the information received by that antenna is passed to

the microprocessor?

A Yes. I mean, through other components, but if it's on reception, for example, in that environment where we are receiving through the antenna that information would be passed through the microprocessor.

Q So it is -- one of the stops would be the cordless receiver 221, is that correct?

A That's right.

Q And then this annotation is indicating that information received by the antenna in receive mode goes through the cordless receiver and then that data or that information is passed to the microprocessor, is that correct?

A That is, yes, my opinion.

Q If we look at Paragraph 87, you have a couple citations. Can you tell me I guess 87 and 88, perhaps 88 has the references, but where is it that you are citing the disclosure that indicates that the information received from the antenna is passed to the microprocessor?

A I don't see the reference that -- in those

paragraphs I don't see quickly the references unless it might be in Paragraph 88, I think that first reference there, I need to look, but I think that first reference is a paragraph in Byrne that talks about what you are referring to of the microprocessor's role in the data.

Q You are talking about in Paragraph 88?

A Yes, in Paragraph 88 it is EX-1008, column 8, Line 16 through 23, but I need to go to clarify that's the right reference that I am thinking of.

Q Sure, that's why I introduced Byrne already.

If you would take a look at Byrne and let me know if that's what you are referring to.

A That's the reference that I was thinking of.

Q So this is 8, 16 to 23, it is part of the paragraph that finishes up at 28, correct?

A Yes.

Q And so the paragraph says when operating as a cordless telephone control signals from the microprocessor 210 enable cordless receiver and

cordless transmitter 222 is enabling -- I am sorry -- is controlling signals from the microprocessor -- strike that.

So there is in this first sentence there are control signals that are coming from the microprocessor, correct?

A Yes. The first sentence talks about control signals for enabling the cordless transceiver, that's correct.

Q And then the next sentence is the microprocessor also monitors signals from the cordless receiver indicating received signal strength and for detecting received data and from the cordless transmitter 222 for sending transmit data, correct?

A That's the next sentence, yes, sir.

Q And so that means that the microprocessor receives signals from the cordless receiver that indicates the received signal strength, that's one item, correct?

A That's one item, yes, sir.

Q And then it receives signals for detecting

received data, correct?

A Yes, sir.

Q And then from the cordless transmitter for sending transmit data, correct?

A That's -- yes, those are the three elements of that sentence, yes.

Q Anywhere in there does it refer to processing the received data?

A It doesn't expressly use the words processing the received data, but detecting is a form of processing.

Q Is it of the data received?

A I am sorry, I don't quite understand.

Q Detecting that the cordless receiver is receiving data, does that mean that the microprocessor is also receiving that data?

A Well -- so Byrne here -- you know, this is the only sentence we have, so Byrne here is not highly clear on everything that he means by this sentence, but it certainly leaves a POSITA to understand that data is being passed from that receiver to the microprocessor.

Q Is it the same data that is being received by the antenna?

A Presumably, right. Again, he is not highly explicit here, this is kind of the only sentence we have of exactly what that data is and what is happening, but data would be coming through the antenna that would end up at the microprocessor through this channel, it is just not highly explicit or not explicit at all about what form that takes.

Q Why is it your opinion that it would be -- that it would -- data would necessarily end up at the microprocessor through this channel?

A Well, again, it says here for detecting received data, so what's doing that detecting, what's doing that processing, the processor he discloses is the microprocessor 210.

Q For detecting that the cordless receiver is receiving data, correct?

A Well, I think when you add those words for detecting that the cordless receiver is receiving data, that's not what he says, he says for

detecting received data.

Q But the microprocessor is monitoring signals from the cordless receiver indicating -- I am sorry -- monitoring signals from the cordless receiver for detecting received data, correct?

A That is what the language says, yes.

Q And it wouldn't need to monitor signals from the cordless receiver for the microprocessor to receive data, it would know already that it is receiving that data, correct?

MR. KAZI: Objection to the form.

THE WITNESS: But that's not how it would work, right? I mean, if it's monitoring an input line to say, oh, data is coming in that I need to process, that would also be consistent with this language.

BY MR. UDICK:

Q Why would it need to input -- why would it need to monitor an input line if it would be receiving the data?

A Every microprocessor is monitoring its input lines, right, you have input lines that will

say, okay, I have got data here, I need you to do something.

Q But it's not --

A That's not how microprocessors work.

Q Apologies.

But the disclosure in Byrne isn't that it is monitoring its own line, it says the microprocessor is monitoring signals from the receiver indicating or detecting received data, correct?

A When you say its own line, so -- I mean, that would be coming -- anything that's coming from the cordless receiver, in this case 221, would be coming in to the microprocessor on a line of the microprocessor, so I am not sure I understand your question.

Q What would the microprocessor then do with that data?

A Again, Byrne has not expressed as to what that processing might look like, but there is a lot of processing that might happen to that data stream, right? I mean, it is coming in -- it uses

digital standards so there is all kinds of processing that needs to happen to get that in a form, say, where a speaker could actually play that.

Q In Figure 2 that you reference what you don't highlight is a line from the cordless receiver to the cordless audio, correct?

A I don't highlight it, but it's there, yes.

Q What is your understanding of what that is passing?

A Well, once again, Byrne is not highly explicit about what signals go where. At a minimum that is something that the cordless audio could do some maybe filtering or amplification of or something like that to send it out through the audio switch to the speaker in this particular case because we are receiving.

Q Is there anything -- is there any disclosure in Byrne that the information is sent to the speakers from the microprocessor?

A I am not aware of any disclosure, I don't recall any disclosure in Byrne that says that the

microprocessor 210 sends audio data to the speaker.

Q Byrne is explicit -- Byrne does indicate that -- if you look at Byrne in Paragraph 7, beginning at Line 56, the microprocessor 210, and that's the microprocessor that you highlight, correct?

A I am sorry, you said paragraph -- you meant column 7?

Q Yes, I am sorry.

A Yes, I am there.

Q It said the microprocessor 210 illustrated in Figure 2, which is the microprocessor you identify in the annotations, correct?

A Yes.

Q It says it's adapted to operate in accordance with the flowcharts illustrated in Figures 3 through 4 for controlling the CCT 200 is a cordless telephone, a cellular telephone, or a cellular cordless telephone, correct?

A That's correct, that's what it says.

Q As relates to Byrne it does tell you what

the microprocessor in Figures 3 to 4 does, correct?

A Just to be precise, it discloses that functionality of -- that's something that the microprocessor does.

Q And if you look at Figures 3 or 4 do either of those figures indicate that -- indicate processing data received by the antenna?

A In this case these flowcharts they are talking -- they talk about what's being monitored and then how to control the phone, how to maybe hand over or switch over from one modality to another, so that's their main objective.

Now, to answer more specifically your question about whether or not data coming in from the antenna is ending up in the microprocessor, I think it's a little more nuanced whether that's happening or not. It is certainly not expressed in these figures.

Q And the flowcharts that they talk about what's being monitored and then how to control the phone, that's also consistent with columns 7 and 8

in their discussion of the microprocessor that it relates to how the microprocessor controls or monitors the device, correct?

A Well, there is certainly consistency there, yes, there is, I know in particular in the last sentence of the paragraph we were talking about in column 8, it is the sentence that starts I think on line 23 where it talks about additionally the microprocessor monitors control signals from the cordless transceiver 220 for detecting incoming calls (ringing), security codes and broadcast information relevant to the cordless system and for sending dialing information.

So certainly we have got some control work going there, control work going in in the first sentence.

This middle sentence that we have been focusing on talks more expressly about received data in this case.

Q So what does -- what does the received data -- what does the microprocessor do with what you have identified as the received data?

A Well, as I have already testified he is not expressive about what that signal processing or data processing might look like. So now we are left to sort of speculate or a POSITA would look at all the processing that needs to be done and figure out what's happening, how is it going to do that, so there is a lot of answers that we can talk about for what that microprocessor might be doing with that data.

Q Would it be fair to say that the cordless receiver processes incoming data?

A Well, once again because Byrne is an express there is something happening in the cordless receiver, right, to that incoming stream, and what it might be doing versus what the microprocessor might be doing is just unfortunately not expressly given in this description.

Q Doesn't Figure 2 make it fairly explicit when it shows the input to the cordless receiver and then an output to the cordless audio?

A Well, it certainly shows that data comes

in through the cordless receiver, there is connection to the microprocessor and information goes out of the cordless receiver through the cordless audio. That is certainly shown.

Q You don't say that the information received by the cordless receiver is passed to the microprocessor then passed to the cordless receiver to the cordless audio, correct?

A That is one possible path for that kind of information.

Q But Byrne identified the connections between the cordless receiver and the cordless audio in a graphically different way than the connection between the transceiver and the microprocessor, correct?

A That's correct.

Q There is no direct disclosure that says the microprocessor sends information to the cordless receiver to go to the cordless audio, correct?

A Yes.

I am not aware of any disclosure that

would disclose exactly what you just said.

Q And no express disclosure that said that the cordless receiver takes the information received from the antenna and passes that information to the microprocessor? And, being clear, I said no express disclosure, is that correct?

A Can you repeat it? I am sorry, I want to make sure I understood it. It wasn't that you weren't clear, I just want to make sure.

Q Sure.

And there is no express disclosure that said that the cordless receiver takes the information from the antenna and passes that information to the processor, is that correct?

A Well, express, I mean, I think that paragraph and that sentence we talked about in column 8 about detecting received data does indicate a passing of received data from the cordless receiver to the microprocessor.

Q But it never says the microprocessor receives that data, it says that -- only that it

detects signal from the cordless receiver for detecting received data, correct?

A That is the language -- I will agree, that is the language from Byrne, yes.

Q And it is possible the cordless receiver could process the signal itself, correct?

A So now -- let's be precise. When we talk about a signal I think a better way, if I may pose your question, is it possible that sort of the audio signal, the audio information that's being received is received by the receiver and passed to the cordless audio block without that data being passed to the microprocessor, I believe that is an embodiment that could be implemented through this architecture.

Q For cordless audio it then goes to the audio switch, correct?

A That's correct.

Q And then outputted through the different speaker means, so either a microphone or maybe a loud speaker or a hands-free speaker, correct?

A In this case it would be output through a

speaker of some form, yes.

Q Here and then in Paragraph 8 in 39, Line 39, again, you have the audio switch is controlled by the microprocessor to link the cordless audio channel or the cellular audio channel to the microphone and loud speaker as appropriate, correct?

A Yes, that's correct.

Q And so, again, that's the microprocessor acting as a control mechanism for the other components, right?

A Yes.

In this case on the audio switch, just to be clear, the audio switch, the microprocessor 210, controls that audio switch to route audio signals from the microphone or to the speaker, depending on which of the devices is active.

Q Which comes from the cordless audio module 240, right?

A I am sorry -- yes.

So, for example, cordless audio information is passed through the block 240 and

put into a form to drive a speaker in this case.

Q Through it looks like A2 is a connection to the audio switch in a cordless audio that's likely related to the receive function or giving the user the received information in one form and then B2 appears to be kind of the opposite pathway that it provides the information to cordless audio, correct?

A From the microphone 261 if now the user is speaking Item B or 261 connected to Part B on the audio switch is a microphone and that would be routed by the audio switch into the -- out the port B2 into the cordless audio block into the transmitter.

Q Do you have an understanding of what the cordless audio block 240 does?

A Again, I am not aware of -- I am aware of the kinds of things that a cordless -- that an audio block like that might do. I don't believe that Byrne is explicit or express about the actual things that are done in that box.

Q I am just looking through this paragraph

to make sure I have everything I needed.

In looking at 87, Paragraph 87, here is your opinion that the data streams are processed in parallel, is that correct, or at the same time?

A Yes.

Q What is the data that you are saying is being processed at the same time?

A This is consistent with the conversation we have been having.

Depending on how a POSITA would use this architecture would kind of control what that data is.

I mean, we already talked about at one level that could represent the audio data and some digital signal processing being performed by the microprocessor.

It could mean other kinds of data, header information that's on every packet of the received signal, for example, or that needs to go on to the transmitted signal.

So, again, it is not express. I think a POSITA would have some liberty in how to use the

microprocessor and transceiver together to accomplish the goal.

Q Is the data streams that you talk about in 87 that are being processed simultaneously the same data streams you refer to in 88 regarding --

A Yes.

Q -- the microprocessor processing them?

A I apologize for jumping in.

Yes, yes, the data streams would be consistent between 87 and 88 in my declaration.

Q In both those cases that is the data stream that comes from the antenna 228 or 238 for the corresponding cellular system, correct?

A That's correct.

Q Is there any disclosure that shows that both audio -- that the audio from both cordless and cellular can be sent to the audio switch at the same time?

A In this architecture in this discussion of this architecture Byrne doesn't disclose sending that at the same time. Byrne just discloses that both the cellular and the cordless can be

operational at the same time, which then presumes a way in order to do that through the audio speaker and microphones.

Q We talked about in your last deposition this simultaneous operation passage a bit. Do you recall that?

A Vaguely, yes.

Q Specifically, if you recall, we talked about how one interpretation of the language of it being in simultaneous operation is that it's -- the device is able to be operated as a cellular cordless device simultaneously, correct, do you remember that?

A I mean, to be clear, it seems to me we were talking about an earlier reference to a cordless -- cellular telephone in the '434, not this one, but maybe something like Gillig, which are similar references, but this one cites that one, am I misremembering?

Q I think we had a specific discussion about Byrne in that regard, but I am sure the transcript is what it is.

A Sure, I -- so obviously I don't recall the details of that conversation.

Q Sure, and that's fine. I am not going to have you dig into an old transcript or anything, but if you had remembered I would follow up on it.

Following your discussion of Byrne then on page 62 you have your first obviousness combination, that's Byrne and WO748. Do you see that?

A Yes, sir, I do.

MR. UDICK: If we would pull up -- and if we could, Mr. Shanklin, pull up Doc 7.

(Document identified as Exhibit 1007 for identification.)

BY MR. UDICK:

Q Dr. Jensen, this will be another exercise of ensuring that we are both looking at the same reference and referencing the same. So Doc 7, as I understand it, is Exhibit 1007 from the petition. And it is also what, Doctor, you refer to as WO748 in your declaration, if you would let me know if that's your understanding as well.

A Yes, I believe this is the document that I used.

Q We can take down 1007.

Dr. Jensen, what is your understanding of what WO748 is?

A When you say what it is, what it teaches?

Q What technology does it cover, yes.

A It is particularly talking about the challenges of getting cellular and other similar kinds of wireless signals that are transmitted from outside a building to inside a building and therefore creating a capability to bring those signals in inside the building in a way that it provides good coverage within the building.

Q For WO748, that's embodiment to work in the outside world, is it a modification just to a device or is it a modification greater than that?

A To a device like -- can we be more explicit about what we mean by a device?

Q Sure.

So if you -- you combined Byrne and WO748, correct?

A Yes.

Q Do you combine just changes to the device in Byrne to be the Byrne WO748 combination?

A I understand your question, yes, thanks for the clarification.

So in this case it's really not as much about a modification of, say, the device, say a handheld or portable device that we might -- that Byrne teaches, right, a cellular cordless phone. It's modification to the infrastructure that would support that device.

Q Understood.

And would there need to be any modification to Byrne to support that infrastructure?

A I mean, there are different ways you can implement that, but you could implement that combination in a way without needing to modify Byrne's device.

Q But how would you do that?

A Well, what WO748 teaches is a way with this combination of remote units, these sort of

almost micro cells within the building to be able to pick up a wireless signal from a device like Byrne's using those remote units or these almost sort of micro cellular base stations, although they don't have the full functionality of a base station, and then routing that through a fiber optic network routed in the building out to a base unit then for connection to the outside world in one form or another, at that point the handheld device doesn't need to be modified.

Q You used this combination with reference to claims 3 and 4, correct?

A That's correct.

Q And that begins on Page 65 of your deposition -- I am sorry, of your declaration, correct?

A I am sorry, yes, I -- let me just double check.

Yes, that's right, that analysis starts on Page 65, yes.

Q It says that the device is further in communication with a network switch box configured

with a plurality of ports and configured to connect to a plurality of networks to forward packets between different networks and join a virtual network, do you see that?

A That is the claim language, right, yes.

Q Is it your understanding that is it the network switch box that is configured with the plurality of ports and configured to connect to a plurality of networks to forward packets between different networks and join a virtual network?

A Yes, that is the reading that I have of this claim.

Q And the distinction I am drawing, just to be clear, is when it says that the -- when it uses configured or connect or join it's referencing what the network switch box is configured or connected or joining, is that correct?

A My understanding is that the network switch box is what is configured with plurality ports to connect to a plurality of networks and to forward packets between different networks and join a virtual network, that that describes the

network switch box.

Q Where in WO748 does it show joining a virtual network? Let me strike that.

Where in WO748 does it describe a network switch box that joins a virtual network?

A My recollection -- we need to go through carefully, my recollection is WO748 does not disclose a virtual network or the remote unit or the base unit joining a virtual network.

Q This relates to your Paragraph 120?

A Bear with me.

Yes, this is where I discuss virtual network, yes.

Q Here identified -- in virtual network you also say that an example is a VPN, correct?

A Yes, a VPN or virtual private network is an example of a virtual network, yes, that is what I say.

Q Would you agree that virtual network provides kind of a logical but not a physical separation between network communications?

A Yes, I think that's a good description of

virtual network. I mean, there is a physical connection, but it is a more public or external physical connection that you make it more private or kind of internal network logically, so, yes, I think your description is fair.

Q Things like MPLS that would tag frames in advance, that would create a logical segregation of the network traffic as an example, correct?

A Yes, I am not familiar with all the standards, but that is the kind of functionality of a virtual network.

Q In Exhibit 1007 in WO748 the network that it is referring to it is already physically separated, is it not?

A I think we are going to have to delve into that a little more, I am sorry, I am not sure I am following your question.

Q Sure.

From Exhibit 1007 in WO748 the only traffic occurring through the network box is traffic from the remote unit, correct, or remote units?

A If the network box, for example, is the remote unit then, yes, there is traffic flowing through those, yes. That's the traffic being discussed in WO748.

Q And what would you logically -- what would you logically separate from the network box, you know, what would be the logical separation that would exist for a VPN or a V link?

A So, again, I am not sure I am following the question because -- you are going to have to help me, I am sorry, I am not sure I am following the question.

Q Sure.

So you discussed some benefits of using a VPN in 120 here, correct?

A Yes.

Q Such as securing the network by stopping third-party access to the network, e.g., preventing a third-party application or website from tracking activities in the network, correct?

A For example, yes.

Q And in that example in the network box

that we have in WO748 where would the third-party access come from?

A I just need to make sure I understand.

So the third-party access, meaning you are talking about the remote unit joining the virtual network, that's what we are specifically talking about.

Q So for whatever you have identified as joining the virtual network, yes, if that is what you were pointing to that is what I am referring to.

A In my declaration I treated this as the device joining a virtual network, the challenge here is whether -- you know, if the remote unit, which we are calling the network switch box, at least in my declaration that's what I call the network switch box, can join a virtual network.

It certainly could because it is connected to networks, but there is no disclosure about that remote -- that remote box connecting to a virtual network. So it would have to be some sort of a remote box with that capability, a remote unit to

use the WO748 language to be able to join. It would have to have a capability to join a virtual network.

Q And then you also point to virtual networks can prove network scalability by running applications in a cloud environment providing remote employees access through secure VPN tunnels, correct?

A Yes, that's correct.

Q And would that also require a network -- where would that VPN tunnel begin?

A Well, again, it depends on the device we are talking about connecting to it. That could be done on the device, right, the device, but if it is the remote unit that's actually doing that then that would have to happen at that remote unit.

Q That would grant access to everyone connected to that remote unit into that secure network, correct?

A Presumably. Presumably if that remote unit is a part of the VPN then everything communicating with it would be part of the VPN.

Q Which could or could not, depending on where that remote unit is, could be granting access to people that aren't employees if it is a public box, for example, correct?

A Yes. In that case you would have to implement it in a way that they have to authenticate to that remote unit somehow.

When I say they I mean the subscribers of the mobile devices.

Q We then move to -- actually, we have gone about an hour, sorry, about that if we want to take a five or ten-minute bio break?

A Sure, that would be great. Let me know when we are coming back.

MR. UDICK: Let's go off the record.

MS. REPORTER: We are off the record at 10:39 Mountain.

(Recess taken.)

MS. REPORTER: Back on the record at 10:50 mountain.

BY MR. UDICK:

Q Welcome back, Dr. Jensen.

We just talked about Byrne and a combination of WO748, but I would like to move on, if you go to paragraph -- sorry, Page 70.

A Okay, yes.

Q And that's your combination of Byrne, Johnston, and Pillekamp?

A Yes, I am there.

Q Is Pillekamp -- sort of speaking the same language, is that how you would pronounce that?

A Depending on the day, yes.

Q Fair.

And Paragraph 124 has a -- it says Byrne is not explicit as to using multiple antennas for its cellular cordless system and then Johnston teaches using multiple antennas in a cellular and then Pillekamp describes using multiple antennas in a cordless, right?

A That's right.

Q And is that the sort of reliance that you place on each of Byrne, Johnson and Pillekamp, you refer to Johnson and Pillekamp for the multiple antenna disclosures?

A Yes, that's correct.

Q Turning to Johnston in 126, one of the motivations that you identify is the benefits of long-established antenna diversity, is that correct?

A That's correct, that's what I reference.

Q What is antenna diversity?

A Antenna diversity is a strategy where you use multiple antennas on a wireless device to essentially overcome or at least improve what we call fading due to multipath propagation.

Q If you have multiple antennas on the cordless do you transmit the same information across all -- each of the antennas?

A So, for example, on transmit antenna diversity that's one strategy.

For either transmit or receive diversity there is different strategies that you can use to exploit your multiple antennas with varying levels of sophistication.

One option is you could transmit both, the same from both antennas. That's typically not

going to be your best way to use transmit antenna diversity, maybe even a problematic way to do it.

Q What manner did you anticipate a POSITA using when they combined Byrne with Johnston?

A So, again, there is a -- it is very well known in the art, right.

I think receive diversity is more commonly implemented and so there is a lot of different ways it could be implemented. It could be as simple as just selecting the antenna that has the best sort of connection to the other radio. It could be a carefully -- especially on receive a carefully scripted algorithm in order to use both of the signals off the antennas but make sure that they don't interfere with one another, there is maximal ratio combining, equal gain combining.

There is different ways that are known in the art of how to use antenna diversity to reduce states.

Q I understand that there is different ones, do you know -- in your declaration do you take a position as to which one or how the POSITA would

combine those two references and implement?

A I don't believe with Johnston on the cellular that I opined on which one might be used. I need to look through it, I am looking through. I don't believe that I talked about which kind of a combining or transmission algorithm you might use in order to do that.

Q Do you identify whether the diversity would be used for reception or transmission or both?

A That one I am less certain about what I disclosed.

Antenna diversity can be used for both, but I don't remember exactly what I wrote here in this. I just don't remember what I wrote here related to transmit and receive.

Q If you see it as we go through or you remember will you let me know?

A Yes, of course.

Q In 127 you point out a benefit in shielding the operator's head from electrical and magnetic fields and reduce health and legal

concerns, do you see that?

A Yes, I do.

Q This is something that was talked about in the past, but there has never been any scientific information that indicates that there is an actual cause or effect associated with antenna signals near the head, is that correct?

A My understanding, and this was a field of research for me early in my career, my understanding, and there has been no medical link between radiofrequencies and cancer, but there certainly has been concern raised, but, yes, I am not aware of any medical studies that have confirmed that link.

MR. UDICK: Mr. Shanklin, if you could introduce Document 6, this would be Exhibit 1006 from the IPR which I understand to be Johnston.

(Document identified as Exhibit 1006 for identification.)

BY MR. UDICK:

Q Obviously, Dr. Jensen, if you could take a look as well and confirm that's consistent with

your understanding.

A Of course.

Yes, this is the Johnston reference or 1006 in the numbering.

Q Is there a point in Johnston where it indicates that -- we can take that Johnston down.

Where is it in Johnston that it indicates that this is adaptable for the cellular telephone operator functionality?

A Boy, I don't recall.

Q So if we look at I think the first instance of where it may come up is in paragraph 142 -- it looks like Exhibit 1006 you have a few citations here, column 11, 9 to 22. It describes a mobile radio transceiver, is that correct?

A It does talk about that there in that reference, yes.

Q I guess the bottom it says transceivers 308 or 309 are conventional mobile transceivers for cellular phones. Is that at least one instance where you look at it for the cellular aspect?

A Yes, for example, it is -- I mean, even earlier than that when he is talking about the prior art he is talking about a lot of disclosures that were for mobile telephones, so he has got that whole context when he is -- of course he is talking about the prior art and included the background, he is talking a lot about handheld radios and mobile phones.

Q Are you reading mobile phones as the same as cellular phones in this context?

A Well, it was certainly at the time the predominant kind of application for this diversity in the research at the time. That doesn't mean it is limited to that, but it certainly would have been the predominant thing at the time.

Q To incorporate Johnston would you just need to add an antenna to Byrne?

A An antenna and then some sort of combining circuitry.

Q What do you mean by combining circuitry?

A Johnston discloses this. It is also well known in the art.

Different ways that you might use the multiple antennas in some sort of -- in an advantageous way to achieve the diversity.

Q So that's left up to the POSITA to decide?

A Yes. And, again, it is sort of a performance complexity trade-off. For example, Johnston in Figure 29A on Page 13 of the Johnston disclosure talks about a switched selection combiner, so in addition to adding the antenna you would need this capability to decide which antenna you are going to select and create that ability to control that. That's one example.

But then he goes in Figure 29B and says, well, we will do a different kind of a combiner and that, again, could be something more complicated.

Q In the switch selection combiner, 29A, how is that using the antennas?

A So in a switch selection combiner you are using one antenna at a time and selecting them, selecting the one that has the best signal to the other radio or the best channel quality to the

other radio.

Q Is that for reception and transmission?

A Yes.

And you can see in that figure he expressly shows, and it's known in the art, there is an RX for the receiver line and a TX for the transmitter line through the switch selection combiner and then whichever of the antennas is selected for that communication.

Q Would the existing transceiver in Byrne be able to do the combining of Johnston with that modification?

A No. There would have to be modification in order to implement this.

Q Do you know -- is that the modification that would be the combining circumstance that you talked about?

A Well, if I can say what I think is, that the additions would be in addition to adding an antenna or one or more additional antennas, yes, there would have to be the capability to determine which in this particular implementation which

antenna would be selected at any given instant. So the switch as well as the monitoring of which antenna is the best one under current conditions.

Q And that's in the case with a 29A switch selection combiner application, correct?

A That's correct.

Q And do you identify which method that is being combined?

A Are you asking me, please --

Q Maybe we covered this before, in your declaration did you identify in combining Johnston to Byrne the specific implementation that the combination would use for antenna diversity, so would it use switch selection, for example, or a different type?

A As I said, I don't believe anywhere in my declaration I expressly suggest one of the types.

Q And then in Pillekamp that's the reference -- why don't we go to the number here, Mr. Shanklin, if you can open up Doc 9, which I understand to be Samsung Exhibit 1009 in the IPR also the Pillekamp reference?

(Document identified as Exhibit 1009 for identification.)

BY MR. UDICK:

Q Dr. Jensen, if you can confirm that's your understanding as well.

A Yes, sir, I agree this is the Pillekamp or Samsung 1009.

Q If you turn to 132 in your declaration.

A Okay, I am there.

Q You point to antenna diversity again as another motivation to combine, is that correct?

A Yes, the benefits of antenna diversity, yes.

Q In 132 it says that the two antennas are controlled by changeover switch diversity switch/DS. Is that describing a specific type of implementation that you are identifying for the Pillekamp combination?

A The Pillekamp disclosure, I believe, only talks about that sort of switched diversity strategy.

Q In 133 it indicates that Pillekamp's

cordless system is designed to achieve the "lowest possible use of energy," do you see that?

A I do.

Q Then you go on with -- the Pillekamp teaching would operate such that whenever the devices are supplied stationarily, for example, via a battery, through the rest of that paragraph to not belabor reading the entire portion, can you describe a little bit about what that Pillekamp teaching that you reference at column 1, lines 52 to 63 is talking about?

A Right.

So this is additional disclosure in Pillekamp, right, not so much related to the diversity, but it is just sort of a way to make sure that you are using a lower power mode unless you are actively sending a transmission burst or receiving a burst, so it is just sort of an energy savings technique that they disclose by sort of turning things on and off only as they are needed.

Q What did you understand when it said whenever the devices are supplied stationarily,

for example, via a battery, what is that? That one didn't make sense to me so I am just wondering what that means.

A Well, I share your confusion about what stationarily means. I think when it is operating on the battery I think we all understand what that means, so I think we are just talking about it is detached from the base station which doesn't seem like stationarily to me, detached from its charging station and being used as a mobile device when it is on battery, which is when you would want to save energy.

Q What is the time lead in burst transmission that it is talking about, is that -- how does that occur?

A Well, I didn't go through all the details of this so I am not prepared to testify and give opinions on exactly how that works.

Just generally what I understand it to mean is anticipating that something is going to come, and yet I know that they divide it into two parts, just sort of activating the circuit in

advance so that when that burst comes that the circuitry is ready and so some sort of a mechanism for knowing that that communication burst is going to come.

Q Is that something that DECT as a standard already did?

A To be honest, I don't know exactly how that is implemented in a DECT standard. So if that is precisely what it is or not, I am not -- I have not formed an opinion on that, I did not research it.

Q To have the benefit, this specific benefit of the many that you list, for this particular one that would have to either already exist or be developed into the combination to obtain that benefit, correct?

A If you were to want to incorporate that benefit if it's not already there then you would need to do something to create it, yes.

Q Got it.

You would have to then combine, so we have got the Byrne-Johnston combination and we are

further combining it with Pillekamp now, correct?

A Yes, that's correct.

Q And so we have added at least one other antenna for the cellular system and now for this Pillekamp we will add at least one other antenna for the cordless side as well, correct?

A That's correct.

Q And then will the cordless receiver transmitter, will that be already able to handle the additional antenna or will further modification need to be made?

A Similar to my testimony about the cellular side the cordless would have to have some modifications in order to be able to use that one or more additional antennas that would be added due to Pillekamp's teachings.

Q Would any other component of the Byrne-Johnston combination need to be modified?

A Well, when you say additional, again, just to be precise, much like I said in the cellular case you would have to have some sort of combining circuitry or in this case he only discloses a

switching circuitry and then a way to determine which antenna you should be using at any given time under the current conditions.

Q Would you have to -- for the total combination would you have to do anything in regards to power consumption? I will strike that and be a little bit better with my question.

Would you have to modify the combined device -- I will start over.

If you add these two combinations to the existing and the original Byrne would it -- would the two combinations modify the power consumption requirements on the battery of Byrne?

A Modestly but, yes, it would consume additional power.

Q How would it be -- how do you know that it would be a modest change?

A Well, for example, something like switch diversity is not particularly computationally intensive, in fact, it is very, very simple to implement. So compared to usually the power amplifier of a transmitter and the kind of power

that it consumes, the sort of monitoring and occasionally switching is a fairly modest power consumption activity compared to what the radio is already doing most of the time.

Q Would you have to modify anything that Byrne's microprocessor is doing?

A Yes, most certainly, or have some other means of monitoring, right, the relative strength of what's coming in and making a decision whether to switch. So whether it is there or some other dedicated processor there would have to be a control mechanism.

Q You then for claims 13 and 14, this is on Page 80, you combine -- you use that Byrne-Johnston-Pillekamp combination and then add Billstrom, is that correct?

A That's correct.

(Document identified as Exhibit 1010 for identification.)

BY MR. UDICK:

Q And if we can pull up Document 10, which is Exhibit 1010 of the IPR typical exercise, can

you confirm this is the Billstrom you looked at as well as Exhibit 1010 from the IPR?

A Yes, this appears to be the Billstrom reference which is Samsung 1010.

Q Great.

MR. UDICK: And if we can pull that down, Mr. Shanklin.

BY MR. UDICK:

Q In Paragraphs 151 through 155 you generally identify reasons that a POSITA would have modified that combination to add Billstrom, is that correct?

A That's correct.

Q And in each of these -- for the benefits identified in each of these would the infrastructure be required to have adopted the manner in which Billstrom identifies its communication system?

A Yes. So -- yes, Billstrom teaches additions to the infrastructure in order to accommodate internet protocol IP communications, I think that was your question, that is correct, you

need additional -- you need changes to the infrastructure.

Q Correct.

And to modify a mobile device to -- let me think of a better way to ask that, that's a convoluted question.

In order to make -- in order to modify the device to use IP over cellular the POSITA modifying device would need to know what the infrastructure has adopted, correct?

A Yes, that's correct, they have to be compatible or they can't communicate.

Q And at the time of the critical date of the patent is there any infrastructure that settled on what type of structure to use or infrastructure to use for IP communication?

A Let's see, so first of all, so many cases I want to make sure I understand the critical date on this, I think this is like others I think it is June, 1999, do we agree on that that that's the critical date?

Q That is my understanding.

A So assuming that answer, while there was a lot of work being done on this there was not significant or really any rollout yet other than experimental rollouts of IP-based cellular systems.

Q So would the -- if a POSITA had used the -- built a device to use IP communications in accordance with the way Billstrom does it would that individual have been guaranteed a network infrastructure supporting it would be rolled out?

A No. That would have required that the POSITA would have had to do that in coordination with what might be being rolled out in order to make that effective.

Q If we will turn to Page 85.

A Okay, I am there.

Q And here we move into your grounds 2A through the others, correct?

A Yes.

Q I believe, yes. And so if we -- so this is Byrne in combination with Raleigh, correct?

A That's correct, Raleigh in combination.

MR. UDICK: Mr. Shanklin, if you can pull up Exhibit 1005, which is Doc 5.

(Document identified as Exhibit 1005 for identification.)

BY MR. UDICK:

Q And we will go through the same approach to make sure this is the same Raleigh that we are talking about.

A Yes, sir, this seems to be the reference you referred to, Raleigh, Samsung 1005.

Q Great.

If we can take that down. Of course, if you want to look at your soft copy obviously then please do.

And this is the reference that you said you had prior knowledge about kind of even before this case, is that correct?

A That's correct.

Q And it deals with a field that you were -- it was one that you were actively researching and knowledgeable of in general, is that right?

A Yes, I was actively researching these

kinds of techniques at that time.

Q I think space-time signal processing is something that you were involved in research on?

A Yes. More particularly for me the kinds of things that would be needed to support effective space-time processing, but, yes, I also at least very well understood the single processing that was being done.

Q Sure.

So just for the record, what is kind of space-time signal processing?

A Well, prior to this with the exception of not just this reference but a few others that occurred earlier in the late '90s we were using multiple antennas in more simplistic ways like the diversity that we have already discussed here, but with these kinds of disclosures like Raleigh and others we were starting to use multiple antennas in a more sophisticated way.

So spatial processing refers specifically to how we might send information out multiple antennas to have higher data rates and higher

reliability through very unpredictable wireless channels. So the time part is that we have always done processing related to the temporal or time nature of our signals, so now we are adding the spatial part. And whether we are doing it space-time processing or space frequency processing, which is really kind of Raleigh's approach, it is really the same, a traditional kind of processing team or frequency and then a new kind of processing space or antennas.

Q Digging down a little bit -- let me make sure I get the -- spatial processing, what does that kind of refer to, what is the space you are referring to, I guess?

A The fact that instead of transmitting it or receiving it from sort of one point in space you have a set of points in space from which you are transmitting or from which you are receiving and now you are going to do signal processing to exploit that capability as well as what is going on in the radio wave propagation between all of those antennas. So it is the signal processing

specifically to take advantage of this antenna and propagation system that we have.

Q So would MIMO or multiple in/multiple out would that be an example of spatial processing?

A Well, precisely, no.

Precisely MIMO means I have multiple transmit and multiple receive antennas. The spatial processing would be what signal processing am I going to do to exploit that MIMO capability. So a distinction, to the lay person probably not a big one, but to an engineer a fairly significant one.

Q Can you give me an example of spatial processing scheme?

A So in the very simplest one, and maybe one of the first that was disclosed and got a lot of attention, was that I would just take a data stream that's coming in, if I had four antennas maybe I would take the first four sets of bits, and there is a reason I say a set of bits, I say take four bits and then I take the next four bits and I break it into four chunks of four bits and

then I am going to send in parallel each one of those four sets of bits out a unique antenna at the same time at the same frequency. So that would be the very most simple example of a transmit spatial processing, and then at the receiver I have a lot of processing to do in order to determine which bits were which because they are all coming in at the same time at the same frequency, and so there is a lot of signal processing at the receiver in that case.

Q Understood.

So the spatial in that easiest sense is essentially increasing the amount of data you can transmit over a time variable?

A Yes, time and bandwidth. So that particular spatial multiplexing example I just gave you, its goal is to try to maximize the amount of data I send given time and frequency resource.

Q Got it.

What is the -- is there a spatial time -- space-time signal scheme -- signal processing

scheme that Raleigh specifically discloses?

A Well, he gives examples of different things that you might do to jointly process in time and frequency. One example is using kind of a discrete OFPM for the frequency or time processing and then how to take all those symbols and send them out the antennas for the spatial processing part of it.

Q Does it disclose on the receiving side how to kind of handle the signal -- the space-time signal processing on the receiver side?

A So he does have some example embodiments in the mathematics that would go with it, it is fairly complicated but, yes, he has examples of ways to receive that.

Q It certainly brought back memories of my abstract algebra days.

A You are talking to a professor, don't tell me nightmares, tell me it was a great preparation for you.

Q I enjoyed that much more than topology, at least I could look at what I was thinking of in

abstract linear.

If we turn to some of the disclosures that you have in Raleigh, in 164 you identify it appears to be some benefits associated with signal fidelity, for lack of a better word, several variables of signal benefit.

A Yes. I do highlight some of, yes, signal fidelity or other communications advantages.

Q Yes.

This is another aspect that would require that the -- whatever the opposite end of the communication channel is also aware of what is -- of how this processing or transmitting is occurring, correct?

A That is correct.

Q And so in one case it's the mobile device, the other side of it is the wireless base station of whatever system is associated, correct?

A Yes. So the base station and the mobile device would have to agree on how -- they would both have to have the capability and would have to agree in how they are implementing this kind of

technology.

Q Are there any -- in this mode in terms of in 1999 were there any physical limitations on antenna spacing in order to accomplish the diversity?

A Well, I am not sure -- no offense, I am not sure that question is well posed. Do you mean like in a mobile device are there limitations to the spacing that you can have between antennas?

Q So -- thank you. My question is different, which clearly meant that it was not well posed. And obviously no offense taken.

The question is at the time, so in 1999, were there essentially limitations in to how close you could put antennas to accomplish spatial processing?

A Okay, so I think I now understand your question.

So, first of all, the limitations on antennas and their configuration and your ability to do spatial processing really has nothing to do with the time like the critical date, it has to do

with the physics. So that's the first clarification there.

And, therefore, yes, you have to properly design your antennas considering your device in order to get that. So, for example, if it is completely just separation of the antennas you do need a minimum separation in order to have effective kind of diversity or kind of multiplexing gains.

There are other ways to do it, polarization, the patterns, there are other ways to do it that allow you to be more compact, but it is completely separation, there needs to be at least about a quarter of a wave link separation between the devices -- between the antennas, pardon me.

Q And that accounts for how they might -- the difference in the way they will move through the channel to the other side of the device here I am using channel to mean the kind of classic physics definition of the medium through which a signal moves.

A Yes. I think we are talking about in this case the wireless channel, the propagation, the radiofrequency electromagnetic wave propagation through the channel I believe is what you are referring to there. Yes, so the antennas and that propagation, that's an interaction that is critical to the processing that we are talking about space-time coding kinds of processing.

Q Understood.

And in Raleigh is part of the identification of how -- which as you said for which almost which sequence those bits are reconstructed in come from identifying which antenna it was transmitted from in the first place?

A Yes.

Ultimately MIMO techniques depend on being able to separate, maybe not uniquely identifying each individual antenna, but being able to separate out the signals based upon which antenna they were transmitted from.

Q And that's where the half a wavelength

separation comes in to play, correct?

A Yes. And, to be clear, I testified quarter wavelength --

Q Quarter wavelength?

A -- sort of minimum, but half would be preferable if you can get it.

Q And from a quarter wavelength does that relate in any way to physically how they are placed in the device?

A Yes, it relates precisely. I mean, there is a one-to-one relationship depending on the frequency.

Q Right.

A That separation, a quarter wavelength, is a distance once you specify the frequency.

Q Right.

Each wavelength has a particular pattern and the distance associated with that plus the frequency would dictate the physical distance between the two once you do that radio math.

A Yes, well said.

Q If we would turn to -- if we turn to

Page 92 of your declaration.

A I am on Page 92.

Q This begins your analysis of the Raleigh-Byrne combination limitation by limitation, correct?

A That's correct.

Q Over to Page 94, Paragraph 174, you have figure -- Exhibit 1005, Figure 1, annotated, do you see that?

A Yes, I do.

Q And so this is on a transmission side, correct?

A Yes, this is a transmitter side, yes.

Q So you have got -- it begins at input data, right?

A Yes.

Q What is the input data?

A Raleigh is not explicit as to what it might be, but a POSITA would understand that is whatever the device is trying to communicate elsewhere, it could come from a software application, it could be voice, any kind of data.

Q What is the intercoder and interleaving 10, briefly in general what does that do?

A An encoder and interleaving -- encoding is some sort of -- it could be for security purposes, it could be for other purposes, and interleaving is a way of sort of rearranging digital sequences to make them less susceptible to short duration kind of loss of the communication.

Q And then a training symbol injection briefly can you just describe what that is?

A Yes.

For the receiver to do its work it needs to understand the channel over which the information is transmitted and, therefore, it needs to put some known symbols into the stream from which the receiver can then estimate that channel what happened to the data as it propagated.

Q Essentially some markers so that the receiver can estimate what the information just went through.

A That is fair, yes.

Q And then the transmit space frequency preprocessor, what is that doing there?

A Now we are getting into what we have discussed previously, this space-time coding and, as I mentioned, some of it does in the frequency domain instead of the time domain, so space-frequency processing, and that's where all of that is going to happen.

Q It's breaking up or partitioning out pieces to send across that antenna array, correct?

A Yes.

Again, that's a very simple thing, that's not mostly what Raleigh is talking about, but that would be a simple example.

Q And then moving over to Page 95 you have got Figure 3 annotated that's kind of the receiving side of it, do you see that?

A I do.

Q For a large part it looks fairly similar to some extent. What is the difference -- the difference I see is what is the channel ID 130?

A We talked about the injection of training

symbols, the function of that block is to use those training symbols to estimate, as you have said, what just happened to the data and then use that knowledge in the receiver space frequency processor to recover the original data as well as in a decoder and interleaving, just to recover that original data.

Q And then what does the receiver space frequency processor, what is its role?

A These space-time coding algorithms almost always have a part you have to do at the transmitter and a part you have to do at the receiver, so that's in coordination with the space frequency transmit preprocessor that we just talked about, those two have to coordinate in order for this communication to happen to extract the original data in the output data.

Q Got it.

MR. UDICK: Let's go off the record quickly.

MS. REPORTER: We are off at 11:52 a.m.

(Lunch recess taken.)

A F T E R N O O N S E S S I O N

MS. REPORTER: We are on the record at 12:47.

BY MR. UDICK:

Q Welcome back, Dr. Jensen.

A Thank you.

Q When we were -- when we just left we had finished kind of generally discussing Raleigh and the technology it describes and moving on to your analysis with respect to the claim limitations. I think we were looking at -- if not let's go ahead and move to Page 92 of your declaration.

A Okay, I am there.

Q Which begins with claim 1.

A Yes, sir.

Q Actually, if we would go to Page 100, Paragraph 184. Just above Paragraph 184 is the 1D limitation that says wherein one or more subtasks are assigned to one or more channels, and this language comes from the '943 patent, right?

A That's correct.

Q Why don't we do this since it will be

easier, let's introduce Document 2, which is Exhibit 1001, the '943 patent, Mr. Shanklin, if you can pull that document up.

(Document identified as Exhibit 1001 for identification.)

BY MR. UDICK:

Q Dr. Jensen, when you have access and ability to scroll, this is the '943 patent that you analyzed, correct?

A Yes, this is the '943 patent I analyzed, yes, sir.

Q And if we look at claim 1, we can take this down, claim 1 of the '943 patent, that's where this limitation is that has subtasks, one or more subtasks are assigned to one or more channels, correct?

A That's correct.

Q Just so I understand it, when you read and analyzed this limitation how did you understand or how did you apply your understanding of the word subtask in conducting your analysis?

A The '943 patent talks about subtasks. I

wouldn't consider it highly explicit to what they mean, but the reading in the specification suggests that subtasks are just some sort of a block of communication, it might be a task of an application that is broken down, but sort of independent pieces of communication that would need to be sent over the system, so that's sort of my best explanation of subtasks based on the specification.

Q And then just so we are on the same page, what is your -- when you read the term channel or channels in the claim limitation what understanding did you apply in your analysis that's in your declaration to the word channels?

A So here it channels sort of two parts because of the way this and the next limitation their language is, channel being a path, a communication path through which information is transmitted or received coupled with the processing of that information. So the channel seems to encompass both of those in this language.

Q If we look at Page 104, Paragraph 188,

just above it is the 1E limitation that has that same first data stream and second data stream that we kind of looked at with respect to Byrne, correct?

A That's correct.

Q And so my understanding is in this combination in Paragraph 188 you rely on your disclosure from Byrne for this limitation, correct?

A Yes.

So one of the things I discussed with regard to this limitation is the same discussion we already had with regard to Byrne earlier in my declaration.

Q And then you then referred to Raleigh as disclosing this limitation as well, correct?

A That's correct.

Q And are those independent of each other?

A It is sort of an alternative way because Raleigh brings some things in. When we say independent obviously we still have them in the combination but Raleigh discloses in an

alternative view this limitation.

Q And I guess maybe that's what I am getting at, your opinion is that either Byrne or Raleigh disclosed this limitation in this overall combination, is that correct?

A Yes, I think that's a fair way to articulate it, yes.

Q And is it your opinion that you must have both Raleigh and Byrne to disclose -- combined to disclose this limitation?

A I am not quite sure how to answer that, I will tell you why. It is because in this combination now Raleigh is handling the cellular communication, and so in the first sort of alternative, which is consistent with what we had when we had Byrne in other combinations or Byrne by itself, you need that Raleigh piece for the cellular communication and then of course combined in the way that Byrne teaches.

I mean, yes, Byrne disclose it is like we talked about previously and I don't want to be inconsistent with that, but Raleigh is playing a

role in this combination that Byrne alone didn't have.

Q So when you combined Byrne with Raleigh now Raleigh is kind of taking the place of what you had in Byrne?

A The cellular side of what we had in Byrne.

Q And so to that extent they are not independent, but just in terms of exclusively this limitation you are not saying you must use this part of Byrne and this part of Raleigh to disclose 1E, correct?

A Right, right.

In the one description it's really that the Byrne that brings in the cellular and the cordless, and that's adequate disclosure.

Q Got it.

What is the first data stream in Raleigh?

A In Raleigh?

Q Yes.

A So just looking at the Raleigh disclosure the fact that his space-time processing creates parallel data, parallel I think he calls them

symbol streams or sequences I think is the word that Raleigh uses, so one mapping could be the first one of those plurality of symbol streams due to the space-time coding could represent a first data stream.

Q And that's what you have on Page 105 in an annotated version just above Paragraph 190, is that correct?

A Yes.

Q And you identify in your declaration it points to the first and second data stream as coming out of that transmit antenna array, correct?

A That is what I show in the annotated figure and I believe discuss in the ensuing paragraphs.

Q For clarity the first and second data stream that you identify comes from just one input data going into the encoder, correct?

A Yes. In this particular case that is correct, it is an original input data stream that is broke into multiple substreams.

Q If you only captured what you identify as a first data stream in this Exhibit -- in this figure that you have annotated can you -- do you know the entire input data?

A If you only capture one of those streams but you have spread it across multiple but you only capture one then you do not have a complete set of the input data.

I need to back up. It depends, if you do multiplexing like the simplest example I gave you you don't. There are -- because space-time coding isn't always about multiplexing, it is possible that you could extract all the data from that stream, it really depends on how you did the coding.

Q In that way you get to do a coding that would either -- each substream would transmit all the data or it would be recreate be with some N minus 1 number of substreams, correct, or N -- some number minus whatever you could rebuild without the remainder?

A Yes. Yes.

To be precise, space-time coding can be just that coding, which is for error control, and so getting one stream through still possesses all of the data, having all of the streams allows you to reconstruct the data more reliably.

Q But that wouldn't increase any bandwidth or provide any of those other benefits, correct?

A No, that's correct, and you are not really -- you are throwing away spatial coding entirely in that circumstance.

I just want to be precise you could have a single stream, but, yes, you would not enjoy the benefits of the antenna array.

Q Understood.

If you combine Raleigh and Byrne to utilize this on the cellular channel what modifications would you have to make to Byrne?

A For Byrne certainly the hardware for the cellular side of Byrne's disclosure, we looked I think it was Figure 2 earlier, so -- there would be a fairly significant change to that whole side. The hardware and the software would all have to

support this new protocol in order to accomplish that.

Q And would the -- would you have to -- this transmit space frequency preprocessor, would that have to be built into the microprocessor of Byrne?

A So that is one option is to have that and other signal processing built into the microprocessor. Another is to have some dedicated processing for some of that signal processing functions. Those would be the two alternatives a POSITA would be facing.

Q Which one would your POSITA choose?

A I think there are always arguments for both.

I think you have to look at the capability of processors, always fewer processors tends to be better because of the overhead associated with many, many processors on a single system, but then you have to look if the processors that were available at the time, of course we are looking at the critical date here, could handle it or if there would have to be an additional processor

brought into the system. So I haven't done that analysis, but I would be seeking to minimize the number of discrete integrated circuits in order to accomplish my purposes.

Q Does Raleigh describe the physical requirements to implement its disclosures?

A I can't say for certain, but I don't recall any disclosures. When you say physical I am interpreting that to mean hardware, electronic hardware specifically, and I do not recall any disclosures of what it would take other than what a POSITA would understand from the teachings.

Q If you turn to Page 119, this is Raleigh, Byrne, and WO748.

A I am sorry, you said 119, is that right?

Q Yes, Page 119 Paragraph 220.

A Yes, I am there now.

Q It appears that you are using Raleigh and Byrne for the independent limitation that is of which 3 and 4 depend and then WO748 with respect to claims 3 and 4, correct?

A That's correct.

Q If you had Raleigh added to Byrne would there need to be further modifications to WO748 to communicate with Raleigh?

A Yes. For example, if the remote unit were to communicate now with this new combination of Raleigh-Byrne then the remote unit -- you say modification, I mean, WO748 teaches that it could be a variety of different standards. So it is not necessarily a modification of 748, but the remote unit if it is in communication with the device, the Raleigh-Byrne device, then it would have to be configured in order to do that.

Q If it was communicating with the OFDM as an example that Raleigh uses then the device, you know, the micro cell if it was communicating on the Raleigh side would also have to support OFDM, correct?

A For example, yes.

Q Following up into Page 120 Paragraph 223, you use Raleigh, Byrne, and Pillekamp, correct?

A That's correct.

Q And here what isn't there previously used

Johnston on the cellular cite, correct?

A Yes. Byrne, Johnston, and Pillekamp and here I have Raleigh, Byrne, and Pillekamp, yes.

Q And it's because Raleigh discloses using multiple antennas already, is that right?

A Yes. And I think Raleigh and Johnston would not be a combination that makes any sense given Raleigh's disclosure.

Q It looks like the reasons for combining the Raleigh-Byrne device with Pillekamp are the same as those combining essentially the Byrne-Johnston device, does that appear correct to you as well?

A That's my recollection, that the arguments were the same or at least very similar. I don't recall all those details, but yes.

Q In each of these -- so then 134, you have Raleigh, Byrne, Pillekamp, and Billstrom for IP disclosure, is that correct?

A Raleigh, Byrne, Pillekamp, and Billstrom, yes, sir, that's correct.

Q Is there any additional complexity when

combining Billstrom with Raleigh-Byrne-Pillekamp device as it relates to IP, for example, is there any complexity associated with using spatial time processing with the IP-based communication?

A Well, I think not beyond what we have already talked about.

The additional complication here is of course for Raleigh the base station or whatever that Raleigh device is talking to has to know how to do Raleigh.

Adding IP on top of that is similar to adding IP on top of the prior combination that we had with Byrne and the other references without Raleigh.

Q In Raleigh what is your understanding of what a transmitter SOP is?

A Substantial orthogonalizing procedure, I think procedure, let me verify it that word. Substantially orthogonalizing I know is right. The whole idea, and he uses that mainly to talk about the frequency processing that he does, and it's a way of sending multiple data across the

channel, and the orthogonalization is designed so that you are sending it simultaneously so that each of those pieces do not interfere with each other or minimize the interference they have with each other.

Q Does that procedure occur on a single processor or multiple processors?

A So to answer that question properly we have to recognize that a computer engineer or most people when they see a processor they think of one chip. When a signal processing person like Raleigh talks about a processor he's not necessarily, he or she, is not necessarily mapping it to a piece of silicon but rather a block that does a function.

So the answer to your question is Raleigh doesn't answer that question of, again, we talked about he doesn't actually show the hardware implementation of this. He is more interested in the algorithmic blocks that need to happen. He would have multiple processors, but recognize that processor does not mean necessarily one piece, one

integrated circuit.

Q And he talks about the output of those being from the transmitter SOP processor being symbol streams, correct?

A Yes, I think he calls them symbol sequences. Parallel symbol sequences I think is what he calls those.

Q What is -- if you look at -- I am trying to find an easy one here.

Is there a difference -- in Raleigh do you understand there to be a difference between -- do you understand there to be a difference between the input or output data that ultimately transmitted and the symbol stream?

A Well, the precise answer is the symbol streams are a representation of the data, say, on the transmitter that's input, but put in a form, to extract the benefits of the multiple antennas and the algorithms, and then the receiver the same.

You have got these things come in but then you have to process them to get the original data

back as the output data.

MR. UDICK: Maybe we can break a little bit early, I think I am actually pretty close, let me review my notes and see if I have anything else. I definitely would not have stopped for lunch knowing I had this much left. But if -- just a couple minutes and then see if we can wrap up and possibly end a little bit earlier today.

MS. REPORTER: We are off the record at 1:19 mountain.

(Recess taken.)

MS. REPORTER: We are going back on at 1:31 mountain.

BY MR. UDICK:

Q Dr. Jensen, I just want to touch back on something we had talked about this morning. If you go back to your declaration, Paragraph 87, Page 52?

A Okay, I am there.

Q And this is the paragraph where it says, therefore, because -- and this is -- it will be four lines down in that paragraph, because Byrne's

telephone is, quote, so arranged such that both cellular and cordless operations are in progress at the same time, end paren, a POSITA would have understood or found obvious that referring to Figure 2 above the microprocessor 211 is configured to process cordless data stream and the cellular data stream in parallel to ensure that both operations are in progress at the same time, is that essentially what you just said?

A Yes, sir.

Q Are there other ways that Byrne could process the cellular and cordless operations other than having a microprocessor do so in parallel?

A There are other ways, yes, there are other ways that Byrne can do that.

Q And assuming you are correct that this is the way that it does it, what are the other ways that it could have done it?

A First of all, all of the signal processing, again, he is not clear what the data is, but all the signal processing could be done in the other components still in parallel but by

discrete components it could be that there is a nonparallel approach in the microprocessor to process the data, meaning kind of a timed multiplexed approach.

Q Anything else?

A Those are the two main ones I can think of.

Q When you looked at Byrne, as you recall we reviewed Byrne in the context of the '434 patent, correct?

A I believe that's correct, yes.

Q Is there any instance where Byrne meant one thing to you or you interpreted Byrne one way in the '434 patent while in the '943 patent you interpreted it in a different manner?

MR. KAZI: Objection to the form.

THE WITNESS: It's a fair question that I don't -- I just don't recall enough to be able to opine on that or talk about that, I just don't remember, I am sorry.

BY MR. UDICK:

Q In general without getting into any

privileged conversations did you do anything to prepare for today's deposition?

A Yes, I did.

Q And what did you do?

A Reviewed particularly my declaration, reviewed '943 patent, and then reviewed the primary references certainly that we have been talking about today and then spent some time with counsel.

Q And about how much time did you spend with counsel?

A With counsel, probably five hours I guess, I am guessing.

Q And when did that occur?

A Over the course of the week -- of the past week.

Q Do you recall how many number of days it was?

A Well, I do recall that our first meeting on it was precisely a week ago last Monday.

Q Do you know for about how long that meeting went?

A A few hours, recognizing I was preparing for two depositions at the same time, so tweaking out what sections and hours were spent on each is probably -- that's the challenge for me.

Q Fair.

And your other deposition occurred Friday, just three days ago, is that correct?

A That's correct.

Q And I will stop you, I am sure you were asked this essential line of questioning in that deposition, did you do any -- did you meet with counsel at all from the end of that deposition until today?

A Yes. We had one short meeting yesterday, Sunday.

Q For about how long did that go?

A About 90 minutes.

Q And whom was present at that meeting besides yourself, obviously?

A Mr. Kazi and Mr. Park.

Q Just a couple of wrap-up questions again from the previous deposition we had they are just

formalities, during your deposition today did you have any communication means up by which you could communicate with anyone during the deposition and you did in fact do so?

A No, sir.

Q And during breaks did you communicate with counsel at all regarding substance of your deposition?

A No, sir.

MR. UDICK: Subject to any redirect by Mr. Kazi I have no questions.

MR. KAZI: I don't think we are going to have any redirect. In fact, I can confirm we are not. We will review the witness's ability to review and sign the transcript, other than that I think we are done.

MS. REPORTER: We are off the record at 1:37.

Transcript has been ordered for delivery for tomorrow. Mr. Kazi, do you want the same delivery?

MR. KAZI: Patent owner has requested it

delivered tomorrow on an expedited basis?

MR. UDICK: I will say it is us.

MR. KAZI: Yes, I don't think we need it on an expedited basis. I think if we have a standing order, I will take whatever the standing order is, but otherwise we will take regular delivery unless Mr. Park tells me that we need it faster.

MS. REPORTER: Mr. Kazi, do you need a rough draft?

MR. KAZI: I will take a rough.

(WHICH WERE ALL OF THE PROCEEDINGS HAD OR TAKEN PLACE IN THE ABOVE-ENTITLED MATTER.)

CERTIFICATE OF SHORTHAND REPORTER - NOTARY PUBLIC

I, STEPHANIE BATTAGLIA, Certified Reporter and Notary Public within and for the State of Illinois do hereby certify:

That DR. MICHAEL JENSEN, 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, Samsung Electronics Co., Ltd., was represented by counsel at the deposition.

I further certify that the deposition of DR. MICHAEL JENSEN, occurred via Zoom conference, on Monday, March 20, 2023, commencing at 9:32 a.m. to 1:37 p.m., Central Time.

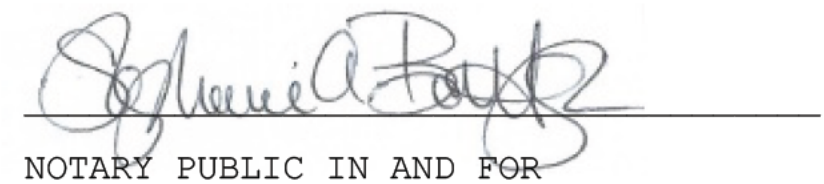
I further certify that I am not related to any of the parties to this action by blood or marriage, I am not employed by or an attorney to any of the parties to this action, and that I am in no way interested, financially or otherwise, in

the outcome of this matter.

IN WITNESS WHEREOF, I have hereunto set my hand this 21st day of March, 2023.

My commission expires:

March 13, 2027



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