UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CISCO SYSTEMS, INC.,

Petitioner,

vs.

XR COMMUNICATIONS, LLC d/b/a VIVATO TECHNOLOGIES,

Patent Owner.

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Case IPR2018-00762
Patent No. 6,611,231
Case IPR2018-00763
Patent No. 7,729,728
Case IPR2018-00764
Patent No. 7,062,296

DEPOSITION OF JACK H. WINTERS, Ph.D.

New York, New York

Friday, November 9, 2018

Reported by:

Shauna Stoltz-Laurie, RPR, CLR

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Deposition of JACK H. WINTERS, Ph.D., held at the offices of Haynes & Boone, 30 Rockefeller Plaza, New York, New York, pursuant to Notice, before Shauna Stoltz-Laurie, a Certified Realtime Reporter and Notary Public of the State of New York.

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J A C K H . W I N T E R S , P h . D . ,
called as a witness, having been duly sworn
by a Notary Public, was examined and
testified as follows:
EXAMINATION BY
MR. NOROOZI:
Q. Good morning, Dr. Winters.
A. Good morning.
Q. Let me start by asking you about
the '728 patent.
A. Okay.
Q. And I'm just going to give you a
copy of your declaration, the petition, and
the patent so that you have those available
to you. Here you go.
A. Okay. Thank you.
Q. Did you have a chance to prepare
for your depo?
A. Yes, I did.
Q. And what did you do?
A. I reread my declaration, and looked
over the patent and the references.
Q. And was there anything that you
thought you needed to correct?

A. No, there was not.

Q. You're familiar with the concept of active probing as it's taught in the '728 patent?

A. Yes.

Q. And if you would turn to column 7, starting at line 11?

MR. EMERSON: Do we have copies of -- I would like to follow along with the witness, so do we have extra copies of the --

MR. NOROOZI: We can get them printed for you. I did not --

MR. EMERSON: You didn't bring them?

MR. NOROOZI: No.

I asked you guys to print them, actually.

(Discussion off the record.)

MR. EMERSON: And you guys may want to follow along as well.

MR. EMERSON: Let's take a break real quick. Let's go off the record.

MR. NOROOZI: Sure.

(Recess taken.)

Q. Okay. So, Dr. Winters, you are looking at column 7, starting at line 11. Did you have a chance to look over that section?

A. Yes, I did.

Q. And you've seen that discussion in the '728 patent before, right?

A. Correct.

Q. It's discussing active probing, right?

A. Yes.

Q. Can you just read out loud starting at line 11 through line 22 of column 7, please?

A. Okay. (Reading:) Act 204 may instead or in addition employ an active client device location monitoring scheme. Here, the beam switching logic 110 may be configured to cause transceiver 112 to periodically send out probe information over one or more selected main beams that elicit some form of acknowledgment in return if received by client device 104. In this

manner, beam switching logic 110 actively probes the coverage areas for each main beam 116 and based on the acknowledging response -- response(s) or lack thereof from client device 104, can monitor or otherwise estimate the likely relative location of client device 104 within the coverage area of access point 102 at a given time or over a period of time."

Q. And do you understand that passage in the '728 patent to define what active probing is?

A. That passage is -- has a definition of Active Probing, yes.

Q. And so can you summarize for me your understanding of what that definition is?

A. That def -- that definition is, for Active Probing, it sends out a probing signal to the clients, and asks for a response from those clients, and the clients would respond therein.

Q. In response to the probing signal, right?

A. The client would respond in response to receiving the -- the probing signal, yes.

Q. Now, in your declaration, you describe your opinion that Antonio teachings meet the active probing requirement, based on Antonio's BMM and PSMM messages, true?

A. Shall I read out of my declaration where I'm talking about that?

Q. Well, I don't know if you need to read it out loud, but if you need to look over the relevant portions, I believe they begin in paragraph 104 and go through paragraph 111.

A. Okay. That's going by paragraphs numbers in here. (Perusing document).

Q. You might be looking at the petition.

MR. EMERSON: Yeah, you're looking at the petition.

A. Oh, oh. Sorry about that.

Ah. (Perusing document).

Okay. I'm at paragraph 104.

Q. Okay, great. So let me just

clarify for the record what we're doing. You're looking at paragraphs 104 through 111 of your declaration to respond to my question as to whether it was your opinion in your declaration that Antonio meets the active probing requirement of the '728 patent claims based on Antonio's BMM and PSMM messages.

A. Yes, I'm looking at those sections there in order to make a -- to verify my statements in the declaration. Okay? (Reading)

Yeah, so that section there describes how the base-station or the main communication node or access point sends a probing signal out using the Beam Mask Message, yes.

Q. Okay. And then the Antonio reference teaches sending out the Beam Mask Message on some periodic schedule, right?

A. Periodically sending the Beam Mask Message, yes.

Q. And it also describes sending back a PSMM signal on some periodic schedule, right?

A. I need to find where that's at. That would be after -- (perusing document) Right.

So going to paragraph 115, "the user terminal transmits a Pilot Strength Measurement Message to the gateway."

Q. On a periodic schedule, right?

A. It just states that the process progresses to the next step, where the terminal transmits a PSM Message to the gateway, and if it's being probed periodically, then you would assume or I -- my opinion is that it would be transmitting it back on a periodic set schedule as well.

Q. Well, right there in paragraph 115 you have a quote from Antonio where it says "It should be noted that steps 506 to 510 are performed periodically by the user terminal." Do you see that?

A. Correct. Yes.

Q. And that's referring to the sending of the Pilot Strength Measurement Message, right?

A. Yes.

Q. Okay. So are you familiar with these teachings in Antonio yourself beyond simply what's stated verbatim in your declaration?

A. I have read Antonio's and I am familiar with those concepts being used in wireless communication systems.

Q. But within Antonio itself and exactly how it works, are you familiar with it, as you sit here, beyond simply what's stated verbatim in your declaration?

A. I am familiar with additional information in Antonio beyond what's stated in my declaration, yes.

Q. All right. So do you remember how the process of sending back of the PSMM in Antonio is set up?

A. I would have to look at that document again to recall exactly how that was done.

Q. In Antonio, if a PSMM is set to be sent out on a periodic schedule but no BMM is set to be -- let me just withdraw that.

The PSMM is sent by the user

terminal to the gateway, right?

A. Yes.

Q. And the BMM is sent by the gateway to the user terminal, right?

A. BMM is sent from the gateway to the user terminal.

Q. So you agree with that I said.

A. That's -- I'm stating the same thing.

Yes.

Q. In Antonio, if a PSMM is set to be sent out from the user terminal to the gateway but no BMM is set to be sent from the gateway to the user terminal, the PSMM will still be sent out, right?

A. That I'd have to look at. I believe that's in the Figure -- (Reading) Just looking at Figure 5(a).

So when I look at Figure 5(a), at least reading that flow chart there, the BMM is first sent out from the gateway to the user terminal, and in response to that message, the user terminal measures the beam strength and -- and then transmits a PSM from

the user terminal to the gateway.

Q. Well --

A. So if the gateway is transmitting these BMMs periodically, then the user terminal is going to be responding periodically to the P -- with the PSMM.

Q. So Figure 5(a) shows a scenario in which a BMM was sent from the gateway to the user terminal, right?

A. Yes.

Q. Figure 5(a) doesn't tell us what happens if there's no BMM sent from the gateway to the user terminal, right?

A. That's right. It's only describing what it does in response to a BMM Message.

Q. So back to my question of whether in Antonio, a PSMM that has been set to sent out would still be sent out if no BMM was received, can you address that question?

MR. EMERSON: Objection to form.

A. So your question then is would the user terminal send out a PSMM if it did not receive a message from the gateway, and I do not see that addressed in this figure here.

Q. And do you have an answer to that question based on your knowledge of Antonio?

A. I do not -- let's see. I do not recall what happened, why a terminal would send out a PSM if it did not receive a request from the base-station.

Q. So let's turn to paragraph 47 of your declaration, please. In paragraph 47 of your declaration, you state that "If the antenna weights in Alastalo are not updated frequently enough, a problem could arise theoretically," right?

A. Yes. If the weights are not updated frequently enough, then you may lose or drop a call, yes.

Q. In Alastalo, there's a teaching that the weights can be updated as frequently as every packet, right?

A. Alastalo indeed states that the weights can be updated as fast as every packet.

Q. And in your declaration, you don't explain why updating the weights every packet would not be fast enough, do you?

A. The declaration itself just states that the weights could be updated as fast as every packet.

Q. In paragraph 47 of your declaration, where you're talking -- when you're talking about the scenario, the hypothetical scenario where the antenna weights are not updated frequently enough in Alastalo, you don't actually describe a situation in which Alastalo would fail to update the antenna weights quickly enough, right?

A. Could you restate that question?

Q. Sure.

In paragraph 47, you describe a hypothetical situation in which Alastalo could fail to update its antenna weights quickly enough, right?

A. I am simply making the statement that if the weights were not updated frequently enough, then the system could fail.

Q. Correct.

But you don't actually demonstrate

that Alastalo would ever fail to update its antenna weights quickly enough, do you?

A. In there, I just simply state that Alastalo, as he states, may have to adjust the weights as frequently as every packet to handle a fast-moving user.

Q. Well, but in your declaration, you never describe or explain why updating the weights as frequently as every packet would not be updating the weights quickly enough, right?

MR. EMERSON: Object to the form.

A. The weights -- I'm just trying to rephrase the question there.

I'm describing here that you would have to, in fast-moving cases, update the weights at least on a packet-by-packet basis, and, however, that there's no statement here that states that that would be indeed fast enough, and that the channel couldn't actually change during the packet itself.

Q. But you also don't describe a situation in which Alastalo would fail to update the weights quickly enough, in your

declaration, right?

MR. EMERSON: Object to form.

A. In response to that, I would say that a POSITA would realize that there could possibly be situations where the weights would not be updated frequently enough or they would not be adequately updated.

Q. I'm speaking specifically about what's in your declaration. Do you follow me so far?

A. I do.

Q. Okay. And what you just told me is not specifically in your declaration, right?

A. What I simply -- what I said was what a POSITA would have stated there (sic), and some of those statements may not be explicitly stated in the declaration.

Q. Okay. So sticking to what's in your declaration, in your declaration, you don't give any explanation of a situation in which Alastalo would not be able to update its weights frequently enough, true?

MR. EMERSON: Object to the form.

A. Again, I have put in what was the necessary amount of information that a POSITA would be able to understand the different situations that could arise, and that if you're moving very quickly, you would have to or would be required to update those weights as frequently as every packet.

Q. "As frequently as every packet."

MR. EMERSON: Is there a question? I'm sorry. Wait for the question.

Q. (Continuing) I'm just confirming what you said. You said "as frequently at every packet"?

A. That there -- as stated in the declaration, the weights could be needed to be updated at least as frequently as every packet.

Q. How quickly is every packet for purposes of Alastalo?

MR. EMERSON: Object to the form.

A. Alastalo does not specifically list a data rate that we would use, but the typical types of numbers would be a packet size on the order of, say, milliseconds.

Q. How many milliseconds?

A. That would depend. Looking back at 2002 versus here or today, today we have systems that operate in the megabit up to the gigabit per second data rates, and there those packets can be much shorter. Those packets -- if you aggregate packets, those packets can be much longer than a few milliseconds.

Q. Okay. So what's the date of Alastalo; do you recall?

A. I do not recall the date exactly. It's approximately around 2000.

Q. Let me pull it up from your declaration.

Take a quick look at paragraph 32, please?

A. (Reading).

Q. Do you see it says that Alastalo was originally filed as a PCT application in February of 2002?

A. Yes.

Q. And as of February 2002 roughly how frequently would every packet have been sent,

in Alastalo's world?

A. If you look at current -- or if you look at communication systems that were in operation around 2002, you may expect that in some cases, packets could be sent as frequently at every few milliseconds.

Q. Can you give me any sense of how few milliseconds?

MR. EMERSON: Object to the form; beyond the scope.

A. We would be talking about communications systems in operation around 2002, which would be referring to wireless LAN systems at that time were operating on the order of ten megabits per second or so, and so --

But, again, these systems were operating -- the wireless LANS were operating in -- as they are today, in time division duplex manner, where they're responding with different packet lengths and different times between those packets, so at ten megabits per second you could have in one millisecond up to 10,000 bits being transmitted then.

Q. Does that mean 10,000 packets?

A. No.

That would mean that you would have on the order of 10,000 bits, as an example, in a packet that was transmitted if it was being continuously transmitted every millisecond.

Q. So back in 2002 it was part of the existing technology to be able to send a packet each millisecond, every one millisecond.

MR. EMERSON: Object to the form.

A. Back in 2002 there was an understanding that packets could be sent as frequently as once every millisecond if not in the current systems, or not in the systems at that time, in systems that were planned at that time.

Q. One millisecond is a thousandth of a second?

A. One millisecond is one-thousandth of a second.

Q. In your declaration, do you have any explanation of why being able to update

the weights in Alastalo every one one-thousandth of a second would not be quick enough?

A. A POSITA would be able to understand what that update rate needed to be there.

And as an example, if you are in a mobile communication system, and you're moving at, say as an example, 60 miles an hour in your car, you're going to have at approximately 900 megahertz on the order of maybe a couple hundred hertz of Doppler; you would be need to be adjusting the weights at least an order of magnitude faster than that, and that would be on the order of at least every millisecond.

Q. I want to make sure that I followed what you said.

Were you saying that if you're in a car moving at 60 miles an hour -- first of all --

MR. NOROOZI: Withdrawn.

Q. Let me back up.

What you just described is not

something that's laid out in your declaration, right?

A. This is -- what I just described is -- would -- would be knowledge that a POSITA would have at that time.

Q. I'm not asking whether it's true or false that a POSITA wouldn't know what you described. I'm asking whether it's something that you've said in your declaration. Do you follow me?

A. I've not explicitly talked about the case of what the Doppler or weight -- update weights need to be as a numerical answer. I was just using that as an example.

Q. You don't have any example talking about Doppler weights at all or a 60-mile-an-hour-driving car or any of those things, right?

A. Because those statements as to how fast you are moving in terms of specific numbers were not placed in my declaration, as a POSITA would understand that these were typical cases.

Q. When you say were not placed in

your declaration, you mean by counsel?

A. No.

I simply did not place them in there because I did not believe that that was -- it was my opinion that that was additional information that was not needed to explain a well-known problem.

Q. All right. So let's go back to your hypothetical of a car driving 60 miles an hour with a telecommunications infrastructure of 2002. Are you with me so far?

A. Yes.

Q. You were saying that in that situation, you kind of did some mental math, and you came up with a frequency at which you thought, based on that scenario, the weights would have to be updated with respect to the communications so that the person in the 60-mile-an-hour car could still have adequate communications, right?

A. That's -- I was looking at -- I was explaining a typical case where you would have to adjust the weights more often than

once per packet, or during the packet itself.

Q. What is the frequency with which you would have to adjust the weights in that hypothetical you were describing, according to your mental math?

A. Adjusting them at least at once -- according to my mental math, you would have to adjust the weights at least once every millisecond.

Q. But you also just said that back at that time packets were being sent at least once every millisecond, right?

A. Yes.

Q. And Alastalo says that you can adjust the weights once every packet, right?

A. Alastalo talks about systems that you may have to adjust the weights as frequently as once every millisecond or -- I'm sorry, as frequently as once every packet.

As an example, in the TDMA system that was used in North America at that time, IS136, which I worked on at AT&T on looking at the use of adaptive antenna arrays there,

we were using training sequences within a TDMA frame, within a packet, and it was found that if you adjusted the weights using that training sequence, by the end of the packet the weights would have actually changed, so you would have actually had to track the weights over that entire packet in order to adequately adjust the weights of an adaptive array.

Q. So this is a new different hypothetical you're telling me about, right?

A. I'm just talking about -- I'm just referring to work that I did when I was at AT&T, along with others, to look at how fast the weights needed to be adjusted in some scenarios.

Q. Okay. But was that scenario a real life deployment scenario in 2002 using that existing telecommunications (sic)?

A. Yes, it was.

Q. And in that scenario, what is it that was causing the situation that you described where the frequency of the weight changes necessary was faster than the

frequency at which a packet could be sent?

A. And this -- so in my published papers, I describe the scenario where the channel itself is changing enough over the duration of a packet such that calculating the weights at one point in the packet would not give you the adequate rate -- weights at another time within that packet.

Q. All right. So does Alastalo describe calculating the weights at one point in the packet compared to another point in the packet?

A. Alastalo simply states that if the channel is moving fast enough, you would have to adjust the weights as frequently as once per packet.

Q. Okay. And you described a scenario where someone is this a 60-mile-an-hour-driving car, right?

A. I described a scenario where somebody was moving at 60 miles an hour, talking on their phone, yes.

Q. And in that scenario, your mental math was that you might need to update the

weights once every millisecond, right?

A. In that scenario, which has been described in published papers that I had at that time, the weights would need to be adjusted more frequently than once per packet.

Q. Okay. Well, that wasn't my question. I was asking you about once per millisecond.

But I also think what you said is inconsistent with what you said before, so let me see if I can clear it up.

I believe you said earlier that in your scenario with the 60-mile-an-hour car, that the weights would need to get updated once per millisecond. True?

A. In some scenarios, that would be the case, that you would have to adjust the weights at least at one -- at the one millisecond rate.

Q. And you also said that at that time packets could be sent every one millisecond, right?

A. In some systems, those packets were

sent every one millisecond, yes.

Q. Okay. Therefore you would need to update the weights with each packet every one millisecond, right?

A. I was describing scenarios where you would have to adjust the weights at least as often as the packet if not faster or if not sooner than the difference between the packets.

Q. Well, you haven't told me how the 60-mile-an-hour car gets you to faster than a packet so far, right?

MR. EMERSON: Object to the form.

A. I'm describing different scenarios, and, as I say in my published papers, I talk about specific scenarios where you would have to adjust the weights more often than once per packet.

Q. Okay. You keep referring to your published papers, right?

A. I'm referring to my published papers, yes.

Q. Do you expect that I've read them?

A. I'm bringing that up as some

material that a POSITA would have been aware of at that time.

Q. Do you understand that whatever it is that the POSITA is supposed to know, that for purposes of this legal proceeding is supposed to be described with some level of detail in your declaration?

MR. EMERSON: Object to the form.

A. I have described in -- in here what I would believe a POSITA would be able to, after reading this, understand all the details, would be able to obtain all the details for.

Q. If you tell me that it's your opinion that someone would do something, full stop, how am I supposed to know on what basis you've put forth that opinion?

MR. EMERSON: Object to the form.

A. I've stated in here -- I was simply referring to the fact in here that Alastalo was saying you may have to adjust the weights as often as once per packet.

Q. How is that responsive to what I just asked you?

A. Can you rephrase the question then?

Q. If you just state your opinion that somebody of ordinary skill would know how to do something, full stop, period, with no other detail, how can I determine the basis for your opinion?

MR. EMERSON: Again, objection to form.

A. I gave a description of what a POSITA would be aware of, what a POSITA would be able to use as references there.

In this statement here, I was simply referring to the fact that Alastalo was saying you needed to adjust the weights at least once per -- you may need to adjust the weights as often as once per second.

And following your line of questioning, I was also responding to the fact that that may not necessarily be often enough, and a POSITA would be able to recognize that although Alastalo was stating that you would have to adjust it as often as once every packet to track a fast-moving mobile, again, a POSITA would realize that

although that was mitigating the problem, that may not completely mitigate the problem under all circumstances.

Q. You have not so far described for me any circumstance in which adjusting the weights once every packet would not be enough, right?

A. I have --

MR. EMERSON: Object to the form.

A. (Continuing) I described to you a scenario which has been described in the literature at that time, where adjusting the weights once per packet was not adequate or would be -- would be required in some cases and would have to be faster than that in other cases.

Q. Okay. Well, if it's adequate, then it's adequate, right?

You're only trying to tell me about the ones, I think, where it would not be adequate. Am I -- am I following you?

MR. EMERSON: Object to the form.

A. Wireless communications is a statistical in nature. There's a wide

variety of different cases that one needs to take into account when they design systems. No system is going to be able to handle all situations all the time. So in many situations, adjusting the weights less than once every packet is adequate. In some cases you need to adjust it as much as once per packet. But in other cases, that may not be adequate enough or that may not solve every conceivable scenario that would be out there, and a POSITA would understand that.

Q. Can we ever solve every possible scenario that's out there?

A. Again, a wireless communications system being statistical in nature means all you can do is give probabilities as to how -- what the performance of the system is going to be.

Q. Okay. So in your declaration, you don't describe any probability of failure with Alastalo's system based on its capability of updating weights once every packet, true?

A. In Alastalo, I do not -- I do not

discuss the scenario where it's not adequate. I simply state that Alastalo states that you may have to adjust the weights as often as once per packet.

Q. In your declaration, you never set forth any estimate of the probability of Alastalo failing or being inadequate with its capability of updating weights once every packet, true?

A. Again, a POSITA would be -- would understand that when I talk about ways to mitigate the fast-moving user by adjusting once per packet, that because the wireless channel is statistical, that that may not handle all conceivable situations.

Q. I asked you I think a different question about what's in your declaration, and about a specific probability, even if it's an estimated probability. Do you follow me so far?

A. I did not state in my declaration any specific probabilities for the occurrence of the event that I am describing right now.

Q. In your declaration, you also did

not describe any improvement in the expected probability of successful or unsuccessful performance with the modification to Alastalo that you propose, right?

A. That gets -- so any POSITA that would be looking at Alastalo would realize that his system is not going to solve the fast-moving user problem in all scenarios.

Q. I think I --

MR. EMERSON: Wait. Let him finish his answer.

Q. Go ahead. I didn't know you were not done.

A. Well, proceed there.

Q. Okay.

So I think I asked you about whether you have set forth in your declaration a specific sort of probability improvement delta measurement estimate of any amount by which Alastalo's probability of success or even adequate performance would improve in light of the proposed modification based on Antonio. Do you follow my question?

A. The issue that I was looking at

here was that Alastalo has a technique that a POSITA would understand is going to solve the situation, the problem of fast-moving mobiles, in many situations but would also understand that it may not solve it in other situations, and therefore the POSITA would look for alternative techniques that might be used to improve Alastalo in some situations.

Q. Okay. So I asked you if you followed my question. That was my last question. Do you remember that?

A. Yes.

Q. And did you give me a yes or no answer?

MR. EMERSON: Object to the form.

A. Please ask the question again then.

Q. In your declaration, do you ever set forth any percentage value probabilistically by which Alastalo's system would purportedly, in your opinion, improve in its ability to provide adequate telecommunications after having been modified in the way that you propose based on the teachings of Antonio?

A. In my declaration, I do not give any specific percentages improvement.

I simply state that a POSITA would understand that there is a reasonable likelihood that there would be improvement or the potential for improvement by implementing the technique in Antonio in combination with Alastalo.

Q. You've mentioned a few times that there would be some scenarios in which being able to update the weight every one millisecond with each packet may not be adequate. Is that true, that you've stated that?

A. I stated that you may not -- it may not be -- completely mitigate the problem of a fast-moving user if you update the weights once per packet.

Q. Okay. And then you described only one actual specific example, which was a 60-mile-an-hour car, right?

A. I was just -- I used one example where I was aware of the situation where adjusting the weights once per packet was not

adequate.

Q. Well, you said that with a 60-mile-an-hour car, you only need to adjust the weights once every millisecond, didn't you?

MR. EMERSON: Objection to form.

A. I was referring to a specific example there. Okay?

And sometimes I also referred to a specific operating frequency, and I was referring to specific packet lengths. There are other scenarios of longer packet lengths. There's other scenarios of faster mobile speeds. There's other scenarios of higher frequencies or carrier frequencies other than 900 megahertz where you would have changes in the channel that were faster than the specific scenario we first looked at.

Q. Well, you have not described any of those scenarios in any detail in your declaration, right?

A. Those types of scenarios were -- was well-known art at that time, and a POSITA would be well aware of that, and I saw no

reason why to put that in there.

I'm simply stating that Alastalo needed to update the weights at least a packet and on a packet-by-packet basis in order to track changes in the channel. I -- I did not state in my declaration that that would completely mitigate all problems.

And a POSITA could would be well aware that there could still be and would likely still be problems that would need to be mitigated by other techniques, and therefore would be motivated to look at other techniques to try to solve the worst case scenarios.

Q. Sir, in fairness, in your declaration, there is not a single specific example that you walk through where you show that Alastalo modified based on Antonio in the way that you propose would statistically or probabilistically expected to end up with a better performance than Alastalo unmodified, right?

MR. EMERSON: Objection, asked and answered.

A. In there I have described the combination, and that it would have been obvious to combine the two techniques there.

It would have been obvious to combine the techniques because people working in the wireless area would want to see improvement in the -- in their wireless communication systems.

Q. Well, they may or may not want to see improvement, but you have not demonstrated any improvement in your declaration based on an actual example and a numerical or any kind of quantification of any expected improvement, true?

MR. EMERSON: Objection, form; asked and answered.

A. I have not in here provided a specific percentage improvement, again, because I would assume that a POSITA would be well aware of the fact that there could potentially be an improvement by combining different techniques together.

Q. Well, maybe there wouldn't be an improvement, right?

A. And that would require analysis to go through and show exactly what that improvement would be.

But both these types of systems existed at that time, and therefore people would be aware of the fact that you might want to look at the advantages and disadvantages of each one and therefore combine the positive aspects of each one to improve the overall performance.

We do see drop call rates and other performance measures such as that, and without in my declaration giving any specific percentage values, giving any specific probabilities of there being an improvement.

Q. So you're saying that a person of skill in the art would look at the possibility of combining Antonio and Alastalo.

A. Yes. A person -- a POSITA would at that time have considered the technologies that were available.

Indeed myself, when I was looking at ways to implement smart adaptive phased

array antennas, was looking at both the implementation of phased array antennas as well as adaptive antennas as well as fixed beam antennas to see which one would give the best improvement under which -- under different scenarios, and how to perhaps combine those together to get an overall system that would perform better than any one of them would have done by themselves.

Q. And if a person of skill in the art had done actual analysis of the relevance and disadvantages of combining Alastalo with Antonio, they may have concluded that they don't want to combine them, right?

A. I do not know what the results of their analysis would be.

But I know when we looked at it at these different cases at this time we could see some advantages of one type of system over the other and vice versa.

Q. When you say "we looked at it," who is "we"?

A. I was at AT&T at that time.

Q. Okay. And --

A. -- I was involved in the AT -- well, I was in AT&T Wireless Research. We were doing research mainly for AT&T Wireless, AT&T lab research, AT&T lab's research. I was head of the Wireless Systems Research department there. So that would include people that I was working with, my colleagues, as well as people in my department.

Q. You yourself are a Ph.D. right?

A. I do have a Ph.D.

Q. And how many people are you working with at AT&T?

A. I was leading a department that had as many as 32 people in it at a given time. The number varied, but I think -- I believe the maximum was about 32 people.

Q. And how many people were involved in this specific research that you were just referring to?

A. Most of the people in my department were involved in wireless communications, as we talked about there.

I was heavily involved in looking

at the advantages and disadvantages of different adaptive antenna techniques along with other types of wireless communications technologies.

Q. Okay. But how many people at AT&T at the time that you were describing were involved in the analysis that you were talking about regarding the possible benefit of being able to change the antenna weights or the communication path more than once every millisecond?

A. I was involved in the research area -- okay? -- and so it was myself plus a couple of my colleagues that did the research in that area. We then transferred that technology over to Advanced Development, and from Advanced Development it went in to Development, and they were looking at how to implement these technologies on AT&T wireless base-stations.

I do not know the exact number, but there were many people involved in looking at the possibility of using and implementing these -- these techniques.

Q. Okay. So you and two of your colleagues, though, did the primary research, right?

A. Yes.

Well, I was doing the primary research, and there were other people that I was collaborating with.

Q. Two other people?

A. I don't recall the exact number of people that I was collaborating with at that time.

But I was talking to everyone in my department, as department head, and so everyone there was well aware of what work I was doing, as we had frequently symposia to discuss our research, and were actively seeking input from other personnel.

Q. Were those other people you were working with -- do you remember their names?

A. I remember some of their names, yes.

Q. And I'm only asking about the ones who were involved in this specific research that you're talking about that then was

handed off to other members of AT&T. I'm not talking about people later on down the chain.

A. Um-hm.

Q. Are you with me so far?

A. Yes.

Q. Okay. So what kinds of people were in your group that you were doing this work with? What were their backgrounds?

A. Some had Ph.D.s. Some had master's degrees. We had people all the way from Ph.D.s that were doing pretty much basic research, but we also had people that were more involved in the technician side of building the systems up.

At that time, for example, we built both phased arrays and an adaptive array, and did multiple measurements doing that, and I was involved in that project, I was helping coordinate that project, but we were -- but there were other people that were involved in actually doing the experiments themselves.

Q. And as of the time that you were doing this research you were coming up with something that was new and didn't already

exist in the field, right?

A. The purpose of doing the research was to come up with novel solutions.

Q. Let me ask you quickly, before we take a break, about an aspect of Alastalo.

Alastalo itself, as it's already built, does not have BMM signals, right?

A. Right.

Q. It also does not have PSMM signals, right?

A. Alastalo does not have specifically -- it does not specifically mention the use of those types of signals.

Q. In fact, Alastalo does not mention any kind of hand-off mechanism at all, right?

A. I'd have to go back and look further at the algorithm, but basically he's talking about how you would adjust the weights.

Q. So for purposes of the judges on the Board in this proceeding who may not understand this information as well as you do, can you expand on what you mean by that?

Can you simplify that a little bit,

in terms of how that relates to an approach of hand-off versus a non-hand-off approach?

MR. EMERSON: Objection to the form.

A. At that time in wireless 802.11, they were not -- the original systems were not adequately designed to very rapidly hand off from one system to another as they were in cellular communication systems. So when you go from one base-station or one access point to another you need to hand the signal off from one base-station or access so that you're now coordinating with or associated with a different base-station or access point.

Q. Antonio is not an 802.11 reference, right?

A. Antonio is -- no.

He's talking about the base-stations going with the satellite disk.

Q. And Alastalo is not an 802.11 reference, right?

A. I don't recall Alastalo mentioning 802.11.

Q. It's cellular, isn't it?

A. (Reading) Specifically talking about -- (Perusing document).

Just looking at Figure 2, it's got a bunch of nodes in there.

Q. Well, if I may, without interrupting you, if this isn't helpful, go back to what you were doing, but if it's helpful, paragraph 39, you have a summary of Antonio?

A. (Perusing document) Paragraph 39 summarizes some pieces of Antonio.

Q. And so you see, based on paragraph 39, that Antonio has a "cellular telecommunications" reference?

A. He referred -- he uses that as an example, using cellular.

Q. Are you aware of anything in Antonio that talks about 802.11 type communications?

A. (Reading) I don't recall Antonio referring to 802.11.

Q. In order for Alastalo to be able to implement the BMM, PSMM and other add beam

set, drop beam set and new active beam set teachings that you take from Alastalo, some modifications would have to be made to Antonio -- to Alastalo, right?

You take the teachings from -- let me --

MR. NOROOZI: Withdrawn.

A. Yes.

Q. In order for one of skill in the art to implement in Alastalo, the BMM, PSMM, add beam set, drop beam set and other teachings that you take from Antonio, they would have to make some modifications to Alastalo, right?

A. Alastalo would have to be modified in order to take into account the techniques that Antonio is talking about, yes.

Q. In your declaration, you don't specifically explain how one of skill in the art would have to go about making that happen, do you?

A. A POSITA would be able to understand how to take the technology from one paper or one patent and put that into the

technology from other patent.

Q. In your declaration, you don't specifically explain how the POSITA could go about doing that, right?

A. Because a POSITA would be able to understand how to do that without any additional explanation that would be required in the declaration.

Q. So it's your testimony that because a POSITA, according to you, would already know how to do that, you didn't need to say anything about how to do it in your declaration.

MR. EMERSON: Object to the form.

A. It's my belief that a POSITA would be able to understand how to take the technology in one patent and apply it in another patent.

Q. If I want to decide whether I agree with your belief, what can I look to in your declaration to see if I also believe that a POSITA could make those modifications to Alastalo based on Antonio or not?

MR. EMERSON: Object to the form.

A. The two -- the two proposal -- or the two patents are in the same general area of wireless communications. In that area, there are a wide variety of known techniques as well as understanding the different techniques that are explained in those patents, and no explanation would be needed to a POSITA as to how to go to one to the other, as they would be able to figure out that by themselves.

Q. When you did the research you did at AT&T, as a part of the conclusion of that research you gave that information to people at AT&T so they could implement the ideas you came up with?

A. The purpose of the research was to show novel approaches, fill in the gaps so that Advanced Development could take those ideas and develop them and put them into products.

Q. So did Advanced Development have to do some more work before the ideas that you came up with could be implemented?

A. At each step in going from research

to Advanced Development to Development there were additional levels of work that needed to be done to take the general concepts, expand them to include how it would be integrated into these existing systems, and what modifications would be needed in order to be able to do that.

MR. NOROOZI: Okay. Let's take a break.

THE WITNESS: Okay.

(Recess taken.)

Q. All right. Dr. Winters, let's talk about the '231 patent. Let me give you your declaration, the petition and the patent.

A. Thank you.

Q. With respect to the '231 patent, you rely on Kuwahara as the primary reference, right?

A. I rely on Kuwahara, yes.

Q. And with respect to what you call Limitation 1.5.2 starting on page 60 of your declaration, you rely on Kuwahara, right?

A. 1.5.2 I rely on Kuwahara.

Q. And then also for 1.5.3, you rely

on Kuwahara, right?

A. 1.5.3 I rely on Kuwahara.

Q. And from both 1.5.2 and 1.5.3, you only rely on Kuwahara, right?

A. Those two points, I only rely on Kuwahara.

Q. 1.5.2 and 1.5.3 together require that the cross-correlated signal information be used to update the routing information, right?

A. Yes. Those two, those require that the cross-correlated signal information is used to update, or the routing information.

Q. And it's your theory that the information that comes out of the correlation matrix 106 in Kuwahara is the cross-correlated signal information that is used to update the routing information for purposes of the patent claims, right?

A. It was my opinion that the cross-correlated signal information that they were referring to in the claim referred to the information coming out of the element 106 in the -- in -- in that document, yes.

Q. You're talking about element 106 in Kuwahara, right?

A. Yes.

Q. Which is also called the correlation matrix, right?

A. (Perusing document) Element 106 is referred to as the correlation matrix estimation.

Q. So it's your opinion that the information that comes out of the correlation matrix estimation 106 in Kuwahara meets limitations 1.5.2 and 1.5.3 of the '231 patent.

A. It was my understanding when I wrote the declaration that indeed the information that was in element 106 met the criteria of being cross-correlated signal information, as described in the patent.

Q. That is used to update the routing information, right?

A. And that information is used to update the routing information.

Q. And the alleged cross-correlation that you're relying on happens at the

correlation matrix 106 in Kuwahara, in your opinion, right?

A. The correlation -- 106 is the correlation matrix estimation, and part of that information comes from the despreading box 102.

Q. Let me be more specific.

What you identify as the cross-correlated signal information for purposes of your opinion in your declaration --

A. Um-hm?

Q. -- is signal information that is, according to you, allegedly cross-correlated at correlation matrix 106 and then output from there, right?

A. That's where the estimate -- in box 106, the estimation of the correlation is mate.

Q. And you contend that that is what constitutes cross-correlating the signal information for purposes of matching onto the challenged claims, right?

A. That's what I -- in my opinion, the

cross-correlation information was the information that's contained in box six oh -- or 106.

Q. When you say "contained in," you mean actually created in, right?

A. Cross-correlation information is created in box 106.

Q. You have some different colors in your figure, annotated Figure 3 on page 67.

A. (Perusing document).

Q. I think you have a black and white copy there.

But do you recall that you have some different colors in that diagram?

A. Yes. That diagram uses different colors to refer to different pieces.

Q. Do you recall that some of it has been colored in teal and some of it has been colored in purple?

A. I do not recall the exact colors, but they use different colors.

And I can see in the document that I have, there are different shades of grey, so (speaking simultaneously) --

Winters

Q. Okay. Well, I think your counsel might have a color version that you could glance over at, if you don't mind.

A. Yes.

MR. EMERSON: (Sharing laptop screen.)

Q. Do you now see the portions that are shaded in teal and the ones that are shaded in purple?

A. You'll have to explain. Teal is green?

Q. Yes.

A. Yes, I see the one part is shaded in purple, referred to as the "Adaptive antenna," and "Signal information using set adaptive antennas" is shaded in green, or teal, as you refer to it.

Q. And then there's another part that's shaded in what's closest to blue maybe?

A. Yes.

And there's a third piece, entitled "Search receiver logic element 106 to update the routing information," and that is shaded

in blue.

Q. And so what delineates the difference between what has been shaded in blue and what's been shaded in green?

How did you decide which one to color which?

A. The part that's in blue contains some of the elements that update the routing information, and what's shaded in green includes the despreading process, the beamforming for the uplink, and the receiver itself.

Q. Well, you see that back at step 115, at the bottom, that that box is in blue?

A. 115 box entitled "Comparing to threshold" is also located in blue, yes.

Q. But then you've got some arrows going from the despreader at 102 into the correlation matrix 106, and those arrows are still green, right?

A. There's arrows going from 102 to 106, and those arrows are green.

Q. And then there are arrows going back from 110 to 103 that are in blue, right?

Winters

A. Yes, the arrows going from 110 to 103 are in blue.

Q. So what is the decision basis for whether something was colored in blue or green?

What are you trying to connote by the fact that you very specifically colored some things in green and some things in blue?

MR. EMERSON: Object to the form.

A. The purpose of creating the different colors was simply to explain in part what the different pieces were doing, what their functions were.

Q. So what is -- well, what is the reason that the arrows that go into box 106 from box 102 are in green, whereas the arrows that come back from box 110 to box 103 are in blue?

A. Box 110 is the array control for uplink, and you need to update the routing information. That routing information includes the beamforming for the uplink. And therefore routing information that comes out of the correlation matrix is used to combine

the signals from the various antenna elements together, so that can be considered as routing information, and therefore those arrows were colored in blue because that was transferring information concerning the routing information.

Q. Did you decide what to color green and what to color blue?

A. I decided what colors should be placed on here in collaboration or in -- you know, it was an iterative approach to determining what colors or what boxes to include in different pieces.

Q. So you also have a copy of the '231 petition in front of you. Could you turn to page 54, please?

A. (Perusing document) Okay.

Q. I'm sorry. Page 57.

A. (Perusing document).

Q. If you look at the paragraph that starts with "Therefore" in the top third of the page. Please let me know when you're there.

A. (Perusing document) I am there,

that paragraph on page 57.

Q. And it states "Therefore Kuwahara's updates to routing information based on the correlation matrix estimator's output, which is in turn based on signals received by the adaptive antenna renders obvious updating routing information," and then it recites the claim limitation of the '231 patent, right?

A. That's reciting based on at least a part -- in part on the "cross-correlation information that is received by said receiver using said adaptive antenna."

Q. Okay. And that paragraph there in the petition is consistent with your opinion that the cross-correlated signal information is the information that comes out of correlation matrix estimator 106 and is used to then update the alleged routing information, right?

MR. EMERSON: Objection to the form. I object to questions about the petition itself is beyond the scope of the direct testimony.

A. I can describe what's in my

declaration, which shows that the routing information is obtained by the correlation matrix estimation, and passed to both the beamforming for the uplink as well as for the downlink.

Q. Do you see any inconsistency between the paragraph that I had you look at in the petition and the opinions to your declaration?

MR. EMERSON: Object to the form. I object to questions -- these questions are beyond the scope of the direct testimony.

A. Again, I have not read the petition in detail, so let me just take a second to read that again. (Reading).

That paragraph agrees with my declaration.

Q. And do you see that at the end of the paragraph they're citing to paragraph 139 of your declaration?

A. Yes.

Q. Do you see that?

A. That, yes, it refers to my

declaration paragraph 139.

Q. And so you agree with the citation in the petition, that the theory that's described there is consistent with what's in your declaration, right?

MR. EMERSON: Objection. Form objection; beyond the scope.

A. The statement that is there is basically restating what I said in paragraph 139.

Q. And paragraph 139 of your declaration in turn is effectively just summarizing what you said about how, in your opinion, Kuwahara allegedly meets limitation 1.5.3, correct?

A. Paragraph 139 is my opinion of how it meets 1.5.3.

MR. NOROOZI: We've got to take a short break for a call by counsel, so we'll do that now.

MR. EMERSON: Thanks.

(Recess taken.)

Q. Dr. Winters, would you turn to paragraph 92 of your declaration for the '231

patent, please?

A. (Perusing document).

Q. Are you there?

A. Yes.

Q. Okay. Could you read it out loud please just that one paragraph?

A. "A POSITA would have understood that by transmitting up-converted composite signals by directing simultaneously a beam towards multiple mobile stations Kuwahara is describing that the adaptive array provides corresponding outgoing multi-beam signals as claimed."

Q. Okay. So in the first half of that sentence, before the comma in paragraph 92, you are describing what Kuwahara teaches, right?

A. I'm describing what he teaches.

Q. And you state that Kuwahara teaches transmitting up-converted composite signals by directing simultaneously a beam toward multiple phone stations, multiple mobile stations?

A. By directing simultaneously a beam

towards multiple mobile stations.

Q. So in Kuwahara, there's a directed beam that's going out, and is intended to simultaneously serve multiple mobile users, right?

A. The question gets into what you mean by "a beam." So if you're directing it towards multiple users, you could have a beam shape or beam pattern that is directed towards the multiple mobile stations and is not necessarily a beam with a main beam pointing towards a particular mobile station.

Q. So can you elaborate a little bit on the distinction that you're drawing there?

A. The typical beam shape that you would get out of a phased array antenna is a main beam with side loads. When we start talking about adaptive arrays, you can shape the beam in other than just a main load or side loads, and you can actually shape it to have nulls or beams pointing in multiple directions.

Q. You were saying that with an adaptive array beam approach, you can shape

the beam, right?

A. Adaptive arrays can shape the beam.

Q. And that's the approach that Kuwahara teaches?

A. Kuwahara teaches adjusting the weights in order to optimize performance, as an adaptive array would do.

Q. In your paragraph 92, you refer to "directing simultaneously a beam," right?

A. The statement is it "directs simultaneously a beam towards multiple mobile stations."

Q. And you see that "a beam" refers to a singular beam, right?

MR. EMERSON: Object to the form.

A. Again, this gets into what the definition of "a beam" is, whether it is a main beam as you would see in a phased array or it's a particular pattern that may have certain shapes associated with it other than what would be typical of a phased array.

Q. So I think we agree that in a phased array approach, "a beam" would definitely mean a single beam, right?

A. A phased array approach, generally you're only producing a single beam in a -- that's pointing in one direction.

Q. And so are you suggesting now that in an adaptive array approach, "a beam" could actually constitute more than one beam?

A. That could form it -- "a beam" refers to a beam pattern, and that beam pattern may not have exactly the same shape as you would have in a phased array.

Q. Well, but is it still "a beam," or is it more than one beam?

A. Again, this gets into the definition of what "a beam" is, and there's various definitions on that.

Again, it's clear what "a beam" is in a phased array, but in an adaptive array, it's not always clear what you're referring to as "a beam."

Q. In an adaptive array approach, it's possible to put out multiple adaptive array beams, shaped beams at the same time, right?

A. Yes, it's possible in an adaptive array to simultaneously have multiple beams

coming out of that array.

Q. Kuwahara never teaches that, right?

A. Kuwahara is teaching based on the receive signals, calculating what that beam shape should be.

Q. A single adaptive array beam, right?

A. He's talking about generating a beam depending on how the signal is coming in. There's different approaches to what we -- what is actually meant by "a beam."

For example, in a multi-path environment, there's not really what you would refer to as "a beam" there, as it's creating a beam pattern which by itself may not even been directed anywhere close to where the desired signal is located at, and instead it is shaped in such a way that the different components in the paths, the multi-path signals will arrive in phase at the mobile itself. So that definition of "a beam" is not the same as having a main lobe of the beam pointing in a particular direction.

Q. Let me be specific about my last question.

Although it is possible to have an adaptive array system that simultaneously outputs multiple adaptive beams, Kuwahara's approach is to output a single adaptive beam at a given time, right?

A. Kuwahara's approach is to output a particular certain beam pattern at a given time.

Q. Okay. So it's possible in an adaptive array system to output multiple beam patterns simultaneously, true?

A. At -- you could output multiple simultaneous beams. In that case, you would be referring to having different signals in each one of those beams. Yes.

Q. In an adaptive array approach.

A. In an adaptive array.

Q. In Kuwahara, there is no teaching of that multi-signal or multi-beam pattern approach to an adaptive array communication system, right?

A. Kuwahara is emphasizing the issue

of receiving a signal from a single mobile.

Q. Okay. But can you just more directly address the question that I asked, please?

A. Could you rephrase the question then?

Q. In Kuwahara, there's no teaching of simultaneously transmitting multiple beam patterns or beam signals using an adaptive array approach.

MR. EMERSON: Object to form.

A. I'm trying to recall exactly what Kuwahara states there, but the focus of that paper is on how you would focus a beam on a particular user.

Q. Okay. So Kuwahara's focus is on transmitting a signal or a beam to a singular user, right?

A. That's the focus --

MR. EMERSON: Object to the form.

If we are going to talk about Kuwahara in detail, can we maybe have the reference to the witness?

MR. NOROOZI: If that's something

that Dr. Winters wants, we can take a break and print it out.

I mean I think what we are talking right now about is what's been put in his declaration, and I'm asking about what's been stated in his declaration.

Q. (Continuing) But I had a question pending, so maybe we can have the question read back, and give me your answer, and then we can take it from there.

A. Okay.

(Record read, as follows:

"Question: So Kuwahara's focus is on transmitting a signal or a beam to a singular user, right?

"Answer: That's the focus" --)

Q. Did you need to add anything else to your answer?

A. I don't think so. No.

Q. In your declaration, you have a claim construction section, right?

A. Yes, I do.

Q. I see it starts at page 13. Will you let me know when you are there, please?

A. (Perusing document) I am on page 13.

Q. Okay. In your Claim Construction section of your declaration, do you ever propose a construction of anything to do with beam multi-beam, adaptive array beam, or any other variation like that?

A. In Claim Construction, I talk about adaptive antennas and the definition of an adaptive antenna. And that definition is "an arrangement that includes an antenna array having a plurality of antenna elements and operatively sporting mechanisms that are part of the wireless routing device." That would include the ability to adjust the weights of those elements in order to produce basically any -- or a wide variety of the beam patterns that could be created.

And, again, those beam patterns could be a -- the results of a phased array, putting a main beam in a given direction, and nulls, or having side lobes in the other directions.

It could also be putting different

beam shapes in there, and in particular, in a multi-path environment, as I explained in many of my papers prior to the 2000; that in the case of a multi-path environment, the antenna pattern itself is not what's of interest. What's of interest is what the signals will be at the receiver.

Q. Okay. So let me follow up on the last part of your statement.

In your Claim Construction section in your declaration, you don't talk about a construction or a meaning for, quote, "a beam," right?

A. The term beam is not used in my claim construction, correct.

Q. Let me just clarify.

You don't propose a specific construction for, quote, "a beam," right?

A. I do not propose what "a beam" is, how "a beam" is sub-defined.

Q. You also do not propose a construction for, quote, "multi-beam," right?

A. Not in -- in the claim constructions, there is no definition of

"multi-beam."

Q. And in your discussion of Kuwahara, going back to paragraph 92, you also don't propose any explicit definition for either "a beam" or "multi-beam," right?

A. Paragraph 92 simply discusses the use of a beam.

Q. It does not provide a proposed definition for either "a beam" or "multi-beam," right?

MR. EMERSON: Object to form.

A. That paragraph there is talking about what a POSITA would understand, and is referring to the fact that you would be creating a beam, and it would use the definition that a POSITA would assume for that beam.

Q. But you don't say in your declaration what that definition is, right?

A. I do not in my declaration have an instruction of explicitly what "a beam" is.

Q. Does the concept of single beam versus multi-beam have meaning and relevance to those of skilled in the art -- skill in

the art in the context of adaptive array antenna approaches?

MR. EMERSON: Object to the form.

A. A POSITA would understand the difference between -- or what a multi-beam antenna was referring to --

Q. Well -- sorry.

A. -- and the ability to form multiple peaks and nulls in the beam pattern.

Q. We're specifically talking about an adaptive array antenna environment, right?

A. Correct.

Q. Okay. And we talked about the fact that in an adaptive array antenna approach, it is possible to simultaneously put out multiple beam patterns; is that correct?

A. Yes. An adaptive array can put out multiple beam patterns, that's correct.

Q. Some of them can, right?

A. Some adaptive arrays have the capability of producing multiple -- multiple antenna patterns.

Q. Not all of them, though, right?

A. It depends upon the -- yes. It depends upon the design of the hardware itself.

Q. How so?

A. If you talk about multiple beams operating at, say, different frequencies, then you would have to have different frequency channels.

In some cases, if you want to simultaneously put one beam out at one direction and another beam out in the other direction, you have to have different signal channels that go out to the elements such that if you had two signals, one signal would be adjusted in phase amplitude perhaps differently on one set of elements, and another signal coming in would have a different set of phase in amplitudes put out on those same antenna elements. That requires certain hardware modifications that are not always possible in every array.

Q. Such as what?

A. Such as duplicating the weights, duplicating the electronics, the logic

elements that require -- that are required in the adaptive array.

Q. What else?

A. The -- the requirement basically is to have two separate channels through your adaptive array in order that you can send one signal through one channel and another signal through another channel, or there's always going to be a limitation in terms of how many signals you can send out of that adaptive array simultaneously based on the circuitry for that.

Q. Now, in Swales, there are multiple adaptive array beams that are transmitted simultaneously, right?

A. Yes. Swales talks about a multi-beam antenna that is simultaneously sending different signals, in some cases at the same frequency at the same time, in the same channel.

Q. In your declaration, you don't discuss whether the adaptive array in Kuwahara is capable of simultaneously transmitting multiple adaptive array beam

signals, right?

A. I do not discuss Kuwahara -- whether Kuwahara could indeed produce multiple signals simultaneously.

Although a POSITA would see -- be able to see, based on work that -- for example, I and others have done prior to that, how you would actually have multiple signals coming out at the same time.

Q. Of what?

A. Multiple signals -- how you could use Kuwahara to actually transmit multiple signals.

Q. By multiple signals, do you mean sending out one formed beam that is directed to a multi-path environment, or do you mean simultaneously putting out different adaptive array formed beams that are meant to serve different clients?

A. I was referring to the fact that you would have multiple clients, and you would be forming a beam for the signal for one client, and that beam would be different than the beam that's formed for the signal

that goes out to a second client.

Q. And your testimony was that based on papers that you had written in the past, someone of skill supposedly allegedly would know how to implement Kuwahara in a way that it could do multiple adaptive array beams serving different clients?

A. My papers discuss the use of multiple clients being served by the same platform, the same adaptive array, but that array developed in such a way that you're sending two different or more signals through that adaptive array to different users with different beam patterns for each user on the transmit side, as well as how you would do this in separate multiple users on the receive side.

Q. In your declaration, you do not discuss whether Kuwahara, as it already is built and defined in its own teachings, has the capability to simultaneously transmit multiple adaptive array beams to different clients, do you?

A. A POSITA would understand how to

take Kuwahara and -- and change that into a multi -- to send multiple signals to multiple users.

Q. So you're saying that Kuwahara, as it already comes, can't do that, right?

MR. EMERSON: Object to the form.

A. Kuwahara, as it comes, does not describe that option, but a POSITA would understand how to duplicate the hardware or software in Kuwahara in order to be able to do that.

Q. In your declaration, you don't propose any such modification to Kuwahara explicitly, right?

A. I do not explicitly talk about what a POSITA would do in order to be able to modify it for a multiple-beam antenna without -- by itself, without referring to Swales as talking about multiple-beam antennas.

Q. In your declaration, you don't even state that a person of skill in the art would need to modify the antenna hardware of Kuwahara in any way in order to be able to simultaneously transmit multiple adaptive

array signals to different clients, right?

MR. EMERSON: Object to the form.

A. Your statement is that I would have to modify -- that modification to the hardware would be necessary. The processing could be done either in hardware or software, but some modification could be done, for example, in software as well as possibly in hardware, because there are multiple approaches to that, which would take Kuwahara and be able to transmit multiple beams, receive multiple -- transmit multiple user signals and receive multiple user signals.

Q. In your declaration, you don't state that a person of skill in the art would have to modify Kuwahara either in software or in hardware to be able to simultaneously transmit multiple adaptive array beams or signals to different clients, right?

MR. EMERSON: Object to form.

A. A POSITA would understand how to make those modifications, because those modifications were very well known at the time and had been implemented as well.

Q. Well, I'm just asking you whether that's something that you even refer to in your declaration much less discuss. Do you follow my question?

A. The -- again, the -- my response is that a POSITA would understand how to go about doing that.

Q. Well, I'd like to know whether you contend that you discuss that issue in your declaration or not.

MR. EMERSON: Wait for the question.

Q. (Continuing) Could you please --

A. Oh, sorry.

Q. (Continuing) Could you please tell me the answer to that question?

MR. EMERSON: Object to the form.

A. Can you repeat the question again?

Q. I'd like to know whether you contend that your declaration already discusses any need for a POSITA to modify Kuwahara's adaptive antenna in order to be able to transmit multiple adaptive array signals simultaneously to different client

devices.

MR. EMERSON: Form.

A. I discuss in my declaration that, as I state here, Swales supplements Kuwahara, and teaches that adaptive antenna arrays in cellular base-stations were known to transmit multiple-beam signals. Therefore, anyone reading the declaration could see that Kuwahara could indeed be modified in order to handle multiple transmit beams.

Q. Well, because Swales says that it's possible for such a thing to exist; is that why?

A. Swales is just teaching that it is possible to do that, but a POSITA would know that that had been done, and how to go about doing that.

Q. Based on Swales, or something else?

A. It would be based on something else, but Swales is just one in -- one reference that teaches the ability to do that.

Q. Swales itself assumes that to implement its teachings, you already have to

be able to transmit multiple adaptive array beams simultaneously to different client devices, right?

A. Swales assumes that you need to be able to transmit multiple simultaneous beams, because he's -- he's reusing -- he;s doing spacial research -- spacial -- sorry, spacial reuse.

Q. And Kuwahara, as it already comes in its own teachings, does not describe how to do that, right?

A. Again, a POSITA would understand how to just duplicate some of the software or hardware in Kuwahara in order to be able to achieve that functionality.

Q. So a POSITA would need some knowledge based on some teachings that are not in Kuwahara and that are not in Swales in order to make the proposed combination that you have between Kuwahara and Swales, right?

A. A POSITA would have to use well-known techniques in order to combine Swales and Kuwahara.

Q. You don't show in your declaration

what these techniques would have been, right?

A. Those techniques were well known at that time.

Q. You don't demonstrate that in your declaration, true?

A. Again, this was well-known technology to do that, and it's not necessary to go through the details on how to do that.

Q. Whether it's necessary or not, you did not include any such information in your declaration, right?

MR. EMERSON: Object to the form; asked and answered.

A. Again, the declaration states or it says that a POSITA would understand how to do that.

Q. Well, it just says that a POSITA would know how to do that, period. It doesn't explain the basis for the statement. Right?

A. Again, how to combine the two together would be well known, is well known in the art.

Q. Where in your declaration did you

show and explain what someone would have to do and why it is that you contend it was well known?

MR. EMERSON: Object to the form.

A. The declar -- Swales, for example, talks about the use of a multiple-beam antenna. At the time that Swales had published that, there were other papers that were -- described how to create adaptive arrays that -- that had multiple beams being transmitted at the same time.

Q. Other papers that are not discussed in your declaration, right?

A. Yes. The declaration does not contain all the references to techniques that were available at that time.

Q. Let me put it this way. Your declaration does not expressly discuss any specific piece of prior art -- prior art reference that would have allowed someone of skill in the art to modify Kuwahara so that it could simultaneously transmit multiple adaptive array signals to different clients, true?

A. A POSITA would be able to understand exactly how to make those modifications.

Q. Okay. So we know about something called Swales in your declaration, right?

A. Yes.

Q. You've named, you describe it, you talk about it, right?

A. Yes.

Q. We know about something called Kuwahara in your declaration, right?

A. Yes.

Q. We know about something called Patel in your declaration, right?

A. Patel? Yes.

Q. Okay. We don't know of any specific reference in your declaration that contains a teaching of how to modify Kuwahara so that it can simultaneously transmit multiple adaptive beam signals to different client devices, right?

A. The techniques for being able to transmit to multiple client devices were well-known technique, well-known in the art

at that time.

Q. You don't have a name of a reference from your declaration that you can give me to prove that, right?

A. I would have to look in details through those references to see what was mentioned in those references, as far as the creation of multiple simultaneous beams using adaptive arrays.

Again, Swales talks about the fact that you have a multi-beam antenna under the assumption that it would -- a POSITA would easily be able to see how to implement something like that.

Q. Well, Swales assumes that you already have that capability before you start trying to implement what Swales is about to teach, true?

A. Swales assumes that you have multiple beam -- or the ability to transmit multiple signals simultaneously on the same channels.

Q. So if someone is starting with Kuwahara, and they want to be able to

transmit multiple adaptive beam signals simultaneously to different clients, they can't find out how to do that by just looking at Swales, right?

MR. EMERSON: Object to the form.

A. By looking at Swales, they would understand that that was the capability, and would be able to find out how to modify Kuwahara in order to have multiple beams.

Q. Would be able to find out how; by going and doing some other research?

A. A POSITA at that time would be aware of the techniques for taking a single user system and making it a multiple user system.

Q. Where in your declaration do you explain that?

A. Again, Swales makes the assumption that you would be able to have multiple beam antennas. Kuwahara talks about how you do a single beam. And the steps from going from a single beam to a multiple beam antenna were well known in the art.

Q. Well, you keep reciting that

phrase, but you haven't demonstrated to me anything that's in your declaration that says that, right?

A. Again, a POSITA would know how to go about doing that.

Q. Based on something that's stated in your declaration?

A. Based on reading the references of Swales and Kuwahara.

Q. Well, Swales doesn't teach how to do it, right?

A. Swales refers to how you would use a multiple beam antenna.

Q. Swales just says you would use a multiple beam antenna, right?

A. Swales talks about the use of a multiple beam antenna.

Q. Okay. But it doesn't tell you how to make one, right?

A. Swales does not go into detail on how to do that.

Q. Neither does Kuwahara, true?

A. Kuwahara is talking about a single user system. However, as with any of these

publications, they have prior references. I have not looked in details at those to see if somebody reading those patents would not be able to go to those other references and see how to go about doing that.

Q. Well, it's certainly not part of your opinion in your declaration that they would be able to, right?

MR. EMERSON: Object to form.

A. It's my opinion that they would be able to do that.

Q. What I mean is in your declaration, you don't say that someone would look at some cited reference in either Kuwahara or Swales and learn information that is pertinent to this entire line of questioning that I've been asking you. Right?

MR. EMERSON: Objection to the form.

A. Again, all I can do is repeat the fact that a POSITA would know how to go from one reference to the other.

Q. Why is that all you can do? Why is that all you can do?

Because I've been asking you whether something in your declaration or not, and indeed all you've been telling me is what you think someone could have done, but you haven't been telling me what's in your declaration or what is not in your declaration.

So why is that?

MR. EMERSON: Object to the form.

A. Swales by itself, talking about multi-user types of systems, could incorporate Kuwahara, and the incorporation of Kuwahara is simply duplicating the hardware and software that Kuwahara has proposed. Therefore someone reading this would understand that it was -- particularly a POSITA would understand it was straightforward to go from one to the other, and, as such, a description of exactly step by step how you would do that was not necessary.

Q. So, Dr. Winters, you're here to give truthful and honest testimony, right?

A. Yes.

Q. All right. And if you don't understand one of my questions, you'll ask me, right?

A. Yes.

Q. Okay. So your name is in your declaration, right?

A. Yes.

Q. Is your wife's name in your declaration?

A. No.

Q. Okay. You know the difference between something being in your declaration and not being in your declaration, right?

A. Whether the exact words are in there or not.

Q. Is your family life described in your declaration?

A. No.

Q. Okay. So you also understand that there are certain concepts that are not in your declaration, right?

A. Certain concepts that are not explicitly explained are in my declaration.

Q. Are not in your declaration.

A. Are not -- yeah. There are certain concepts that are not explicitly explained in my declaration.

Q. Okay. The concept of how to take Kuwahara and modify it so that it can simultaneously transmit multiple adaptive array beam signals to different client devices is not explained in your declaration, right?

MR. EMERSON: Object to the form.

A. I've referred to Swales, I have referred to Kuwahara, and a POSITA reading that would be able to see how to do that, so the declaration does have the information that's necessary to go from Kuwahara to Swales if read by a POSITA.

Q. Show me what is the information that is in your declaration that is the information necessary to allow someone of skill in the art to go from Kuwahara to a system that simultaneously transmits multiple adaptive array beam signals to different clients. Where is that?

A. So if I look after -- on page 42, I

look at paragraph 94, "Part B, Adaptive Arrays For Cellular Base-Stations, it says "Multiple beam adaptive" arrays -- "antenna arrays have been considered by Davies," reference 16, "for enhancing the number of simultaneous users accessing future generation cellular networks." Okay? Now, I have not explicitly looked at Davies, but I would -- it's my opinion that Davies would include in there that what you are doing to create multiple beams is to duplicate the hardware and software of an adaptive array to handle more than one user.

Q. So you're saying that the fact that Swales says that there's another document, Davies, that indicates that such a thing -- that considered -- that considered such a thing would have been enough to tell someone of skill in the art how to go about turning Kuwahara from a system that only transmits one adaptive array signal for one user at a time to one that can transmit multiple adaptive array signals to multiple users at a time?

A. A POSITA in reading that would be able to, in my opinion, be able to go from the single user system to a multiple user system.

Q. Even though you've never read Davies?

MR. EMERSON: Object to the form.

A. Davies states, or in Davies, it talks about using multiple beam adaptive antennas for enhancing the number of simultaneous users, and that means he's going from one user to multiple users. So this is one way, or this is the way to go from having a system that only transmitted with a better signal, as Kuwahara is talking about, to one user to how you would now take that and basically duplicate the process to go to multiple users.

Q. Have you read Davies?

A. I may have. I can't recall whether or not. I can't recall that reference.

Q. You don't remember anything specific about what's in Davies as you sit here today, right?

A. I cannot recall any specific details that's in Davies.

But if you talk about having simultaneous users out there, you would -- it's my opinion you would have to have put in there how you go from a single user system to a multiple user system.

Q. Well, Swales talks about that, and it doesn't tell you how to do it, right?

A. Swales simply mentions that you would have that capability.

Q. Okay. And you don't know if Davies teaches anything more than that or if Davies teaches something that would have been enough, right?

A. Again, I'm not -- I don't have Davies's reference, so I -- it would be my opinion that he would be saying you duplicate certain things, but I have not -- I can't verify that.

Q. Okay. So you have an opinion based on what may be in Davies even though you don't remember anything about what's in Davies --

Winters

MR. EMERSON: Objection; mischaracterizes --

Q. -- right?

MR. EMERSON: -- the witness' testimony.

A. Again, a POSITA would be able to figure out how to do from a single user system to a multiple user system. There were numerous papers at that time that discussed how to go about doing that by duplicating software and/or hardware.

And I was just referring to Davies as one article where that information may be contained.

Q. Or may not be contained.

A. It's possible that he does not mention that, but there would be other references that -- Davies, for example, may reference that a POSITA would find that would discuss the details on how to go from a single user to a multiple user system.

Q. Does your declaration discuss any potential impacts to Kuwahara, whether in terms of cost, latency, performance or

Winters

anything else, from any specific modification to Kuwahara so that Kuwahara would go from being a system that can only transmit one multi -- excuse me, one adaptive array beam signal to one that can simultaneously transmit multiple adaptive array signals for different users?

A. Could you repeat? It's a long question. Could you repeat that question again?

Q. Sure.

MR. NOROOZI: We can have it read back, please.

(Record read, as follows:

"Does your declaration discuss any potential impacts to Kuwahara, whether in terms of cost, latency, performance or anything else, from any specific modification to Kuwahara so that Kuwahara would go from being a system that can only transmit one multi -- excuse me, one adaptive array beam signal to one that can simultaneously transmit multiple adaptive array signals

for different users?")

MR. EMERSON: I object to the form.

A. I have references that I wrote myself or have papers that I wrote myself that discuss how to go from a single user system to a multiple user or multi-beam system, as discussed here.

Q. Okay. But I'm talking about what's in your declaration. You follow me?

A. Yes.

So what specifically is stated in there is, as it states here, it would have been obvious to a POSITA to take the -- to have Kuwahara's adaptive antenna output multiple beams be simultaneous, as Swales teaches, because it would allow for enhancing the number of simultaneous users and increasing the efficiency of the system.

Q. Okay. So that's just a sentence that says it would have been obvious, right?

A. It would have been obvious that it would give you an improved -- an improvement in performance.

Q. Maybe, maybe not.

But do you talk in your declaration about the impact, any consequence, any negative downsides from such a modification?

MR. EMERSON: Objection to form.

A. The declaration itself is talking about trying to look at the motivation for doing such a thing, and that motivation is based upon a reasonable expectation of improvement, and here I'm talking about what kind of improvements that would be obtained by doing that.

Q. You're a -- sorry.

A. There always can be negative consequences or costs or trades that one would have to consider when they went through the design of making these modifications.

Q. In your declaration, did you consider those negative consequences and even if there are any such consequences expressly?

MR. EMERSON: Object to form.

A. I have simply talked about how you would add that feature to using Kuwahara, which a POSITA would understand was duplicating hardware, and any duplication of

Winters

hardware would or potentially result in an increase in cost.

Q. What other consequences would a duplication in hardware have to our system?

A. In terms of?

Q. In terms of disadvantages, costs, decreases in performance, any downsides. What other downsides would it have?

MR. EMERSON: Object to the form.

A. Potentially such -- if you have to duplicate the hardware, that's doubling -- that could potentially increase the cost.

It could also increase the size of the device.

It could increase the weight.

It could potentially increase the amount of power that such a device requires.

Q. What else?

A. Any time you have multiple beams coming out of one device there's the potential for co-channel interference, and in that case, there could be increased signal level or -- sorry, increased interference level.

Q. That would degrade the quality of the communications?

A. That's the trade that you would look at, is the increase in spectral efficiency by having multiple simultaneous users versus the potential to have the system cost more and potentially have co-channel interference, which could potentially degrade the performance as well.

Q. How would you go about evaluating that trade-off if you wanted to do it in the real world as a real engineer?

A. Um-hm.

Q. Like when you were at AT&T, how do you go about determining and evaluating that trade-off?

A. When I was at AT&T I evaluated exactly the same trade by taking a system that was designed for a single user using an adaptive array, and then took that so that you had multiple users using that adaptive array there, and looked at the performance improvements as well as any penalties or potential degradations that would occur

there.

Q. How did you do that analysis?

What did you go through in order to make those determinations?

A. The approach we take is a theoretical analysis, doing approximations in your theory, and then based upon under certain assumptions. We followed that with computer simulation results. I then implemented this in hardware and software, and tested to see what the advantages and disadvantages of using these techniques were.

Q. And only after that analysis did you draw a conclusion about whether you would want to make the modification or not?

A. After that analysis, at each step -- you proceed from step to step based on seeing that things improve with one step, the first step, with theory. So first -- at least from my point of view, the first thing to do is to go and see theoretically does it make sense.

The next step after that is to run through computer simulations, which doesn't

have a lot of the assumptions made in the theoretical analysis there, and based upon positive performance there, you go -- or positive trade there, take the next step, and implement it in a prototype system.

And then we would -- if it still was positive at that time, which it was, we then hand that off to the Advanced Development and Development teams that again go through similar times of processes to see whether or not there's improvement there.

Q. How long did that process take when you did it at AT&T?

MR. EMERSON: Object to the form.

A. The process itself at AT&T, because we were the first ones to actually do something like that, we were pioneering in that area, that research itself was done over a period of many months to go through the theory, many months to go through the computer simulation, many months to implement that in software and hardware.

And those results were published in papers that were widely available.

Q. Your analysis at AT&T was with respect to a specific system and a specific architecture and specific use cases and environment assumptions for the -- for the propagation of the signals that ultimately impacted your final conclusions about the -- the costs and benefits of the modification that you were evaluating, right?

MR. EMERSON: Object to the form.

A. In my research, I like to first do a theoretical calculation that's based on a broad range of systems, and as we go through the research and development process we look at a solution that would apply to many different types of systems, and slowly focus it down on a specific product. Again, that would be the Advanced Development and Development groups' implementation in specific products.

Q. You don't talk about the details of any of that research in your declaration, right?

A. A POSITA would understand that that's the process that you would go through

for coming up with new knowledge, and a POSITA would also be able to look at those previous results and determine how you would go from one system to another.

Q. Are you giving me a reason why you didn't need to put something in your declaration?

MR. EMERSON: Object to the form.

A. Information that I felt a POSITA would be able to -- it would be obvious to a POSITA how to do that, some of those types of -- that type of information was not placed into the declaration, again, because it would be well known, or from reading the declaration, a POSITA would be able to figure out how to do that.

MR. EMERSON: Good time for a break? We've been going for a little over an hour.

MR. NOROOZI: Yeah.

(Luncheon recess taken 12:17 p.m.)

Winters

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

(Time noted: 12:41 p.m.)

J A C K H . W I N T E R S , resumed and testified as follows:

CONTINUED EXAMINATION

BY MR. NOROOZI:

Q. All right, Dr. Winters, let me ask you a bit about your '296 patent opinions, and I'm going to hand over the patent, the petition and your declaration.

A. Okay.

Q. So, with respect to your opinions regarding the '296 patent, you again rely on Antonio as a secondary reference, but instead you rely on Chang as a primary reference in place of Alastalo; is that correct?

A. That's correct.

Q. Now, in your '296 declaration, you propose that a person of skill would have modified Chang in certain respects in light of Antonio, correct?

A. Correct.

Q. And specifically, similar to your '728 patent opinions, you propose that

someone of ordinary skill would have added in the teachings of BMM messages, PSMM messages, add beam sets, drop beam sets, and specifically the soft hand-off teaching of Antonio into Chang; is that right?

A. Based on my -- what I stated in my declaration, is somebody could potentially -- or they would consider the implementations of the techniques that Antonio has into Chang.

Q. Okay. So they would consider it?

A. They would be motivated to consider this as a possible inclusion.

Q. What would they have to do from there to decide whether they would actually implement it or not?

A. Look at what the cost was and what the performance improvement, what the benefit was, the trade between performance improvement and additional cost.

Q. And how would they determine the performance improvement or lack thereof?

How would they evaluate whether there was a performance improvement and, if there was, how much, and if it were

worthwhile?

A. Go through the techniques that I've used in the past, that a POSITA would use as well would be to, for example, run commuter simulation programs to analyze what these two different systems and what the performance improvement would be by taking Chang and adding to that Antonio.

Q. You certainly did not discuss those specific types of commuter simulations in your declaration, did you?

A. A POSITA would be aware what types of computer simulations could be done there.

Q. The testing and analysis that you described would have to be performed before someone would know what its answer would be, right?

A. Testing would be done after a POSITA would look and say, hey, there's the potential for improvement, but to actually know with certainty that there was an improvement generally requires the use of computer simulation.

Q. They don't know the answer to the

analysis before they run the analysis, right?

A. Sometimes you would have an approximate answer from theory as to what expected results would be, so you have an expectation of what the improvement is, but generally you use the simulation to refined -- to refine what that improvement is.

Q. In your declaration, you did not talk about whether the person of skill would in fact have known whether the proposed modification to Chang based on Antonio would have net-net yielded a positive impact or a negative impact, and whether any positive benefit would have been worth it in light of the relevant considerations, true?

A. Somebody looking at -- that was involved with Chang and was looking at the implementation of Antonio would be looking -- would be saying here's some techniques that potentially could provide improvement, but as to any potential improvement, until you actually go through the entire process, even if you have a reasonable expectation that there would be an improvement, you are never

a hundred percent certain until you actually go through the entire process.

Q. In your declaration, you don't discuss the steps that a person of skill in the art would have to take to modify Chang to incorporate the teachings from Antonio that you propose, true?

A. In my declaration, I simply state that a POSITA would be able to understand what was necessary to take Antonio's potential improvement and incorporate it into Chang.

Q. How do you know that?

A. How do I know that a POSITA would be able to incorporate those changes?

Q. Yes.

A. Because the -- the techniques that Antonio has proposed, he describes in detail how he implements those techniques, so the only -- the POSITA would be able to see how those techniques were implemented in Antonio, and look at Chang and say, hey, I can put those types of messages into the processing that Chang is doing there.

Q. Is it your testimony that anything from one system can just be incorporated into any other system in the world of wireless communications?

A. My testimony is not that it could always be done, but in certain areas where the techniques have been well explained, it's possible to take those techniques and apply them to another system. Particularly that would be done if there's the potential for improvement, and the trade would then be how many -- how much modification needs to be done to one system to incorporate it into another.

Q. Well, your declaration doesn't describe the amount of modification that would need to be done to Chang to incorporate the teachings from Antonio, right?

A. My declaration does not state the particular level of research or development that would be required in order to go from Antonio into Chang.

Q. Antonio is about satellites, right?

A. Antonio discusses satellite

communications.

Q. And Chang is about cell towers, right?

A. Chang discusses cell towers.

Q. Neither Antonio nor Chang is about 802.11 communications, right?

A. They are both talking about wireless communications, but they're not talking specifically about 802.11.

Q. You mentioned earlier in your deposition that there were certain issues that were not problematic in the cellular telecommunications world but that were still challenges, even unsolved ones, in the 802.11 world as of the early 2000s. Do you recall that?

A. That I don't recall.

Which specific instance are you talking about?

Q. I believe in that context, you were talking about rapid hand-offs. Does that sound familiar?

A. Well, one of the things I was talking about were rapid fading events, and

you would expect to have more rapid fading occurring in cellular systems than you would in WiFi systems, and that's why the systems were developed differently and came to different solutions, because the applications and the channels and the users are different.

Q. When you say "rapid fading," can you just elaborate on what you mean?

A. How fast the channel changes is dependent upon -- in part, on how fast a user is moving there.

In a WiFi 802.11 system, those were initially designed for mobile or fixed -- reasonably fixed users, whereas cellular systems were originally intended to be placed in automobiles, which, of course, move much more rapidly than pedestrians. Therefore the fading that you typically get in cellular systems will be higher than what you would expect to obtain in most cases in 802.11 systems.

Although that's not always the case. You could be stationary and have, for example, a truck drive by, and that would

create an environment that would change rapidly even though you weren't moving yourself.

Q. I want to go back to one topic regarding your '231 patent opinions.

A. Okay.

Q. Sorry to jump around.

In your declaration, you did not discuss whether any of the operation of Kuwahara as described in Figure 3 which you included in your declaration would need to be modified in any way if Kuwahara were to be modified to be able to emit multiple adaptive beam signals for multiple users simultaneously, true?

MR. EMERSON: Objection to form.

A. I have stated that to go from Kuwahara to a multi -- multi-user system was something that a POSITA would understand, and enough detail was given in that declaration that a POSITA would be able to see how to go from Kuwahara to a multi-user system.

Q. So what I'm specifically asking is in your declaration, you did not discuss

whether as a part of that effort a POSITA would have to change anything about Figure 3 of Kuwahara. Right?

MR. EMERSON: Object to form.

A. In that declaration, I state that Kuwahara could be modified to be a multiple beam system there, and a POSITA would be able to figure out what changes to make in order to go from a single user to a multiple user system, because, as I stated before, that's something that I myself have done as well as other people.

Q. Take a look at page 67 of your '231 declaration, please?

A. (Perusing document) Ah. Okay.

Q. Did you consider whether any aspect of the correlation matrix estimation 106 would have to be changed if a POSITA wanted to somehow modify Kuwahara to simultaneously transmit multiple adaptive beam signals to multiple users?

A. To incorporate multiple users, the software, if that was how it was being done, and the equations involved would need to be

modified to handle multiple users.

Q. How do you know that?

A. Because I've done similar techniques before in changing from single user to a multiple user system, and changed the equations and the software when that was implemented.

Q. Why wouldn't the existing equations in Kuwahara be adequate as they are?

A. The existing equations in Kuwahara refer to a single user system, and, for example, when you go to multiple user systems you might want to use a technique such as successive interference cancellation, which takes into account that rather than having a single user coming in, you have multiple users coming in, and you would want to subtract the interference from one user from another user.

And these were in papers that were written in the 1990s.

Q. And then what about the process of updating the routing information based on the output of correlation estimation matrix 106;

would that need to be modified as well?

A. You'd be changing the software, and so the routing information would potentially be different in that case.

Q. How so?

A. In that case, when you go from a single user to a multiple user system you may be -- it's potentially you could change -- have different weights than you would have for the single user system, but that's not necessarily the case.

Q. So maybe, maybe not?

A. Depending upon the implementation, the complexity, trade of complexity versus performance, one could consider modifying that correlation matrix estimation or potential improvement in performance with multiple users, or one could simply try to repeat the process, the same software, but now handle multiple users.

Q. What about any of the steps in Figure 3 of Kuwahara before step 106 correlation matrix estimation; would any of those steps need to be modified if Kuwahara

were modified somehow to simultaneously transmit multiple adaptive beams to multiple users?

A. If you look at block 102, which is the despreading process, that's using -- a despreading process is doing a correlation with the spread spectrums code that's on the transmitted signals. That code is different for different users, so you can separate one user from another, and therefore that despreading box would have to be doing despreading not just of one user but doing despreading on more than one user, which would require correlating the received signal not just with one spread spectrum code but with a second or third spread spectrum code as well to get the corresponding weights that would be used in the correlation matrix or the values that would be used in the correlation matrix estimation, which, again, would result in different beamforming weights for the two different users.

Q. Do you see any other aspects of Kuwahara's Figure 3 that would also have to

be modified?

A. (Reading) Well, as I said previously, there's a duplication of the hardware or, if this is implemented in software, the software to incorporate another user.

Now, in terms of the adaptive antenna, the same adaptive antenna can be used for the multiple users. However, when we look at beamforming for the downlink, that beamforming for the downlink obviously would need to be different for one user than it would be for a second user, so, again, there would have to be more -- a multiplicative number of weights coming out of there, again, one set for each user that you're trying to communicate to.

Q. You're talking about box 114, "Beamforming for downlink"?

A. Yes.

Q. And what would you have to do there?

A. Again, the beamforming for the downlink, if you were to form multiple beams

or communication with multiple users, you'd have to be forming a different set of weights to do beamforming for one user and then a different set of weights for a second user.

Q. How do you do that?

A. You use the same processing that you would use for a single user but now you come up with a different set of weights for a second user by looking at what comes out of the correlation matrix estimation, which comes about from, as we said, the array control for the downlink, which comes from the interference subspace estimation, which comes from the correlation matrix estimation, and ultimately comes from the despreading, which is done differently for the different users. That is, you're despreading with different spread spectrum signals for -- spread spectrum code for one user versus the second user.

Q. So Swales comes in 1990, right?

A. Swales does come in 1990.

Q. And Kuwahara comes in 1999, in terms of its filing date, right?

A. I'd have to check, but I believe that's about the timeframe.

Q. You can look at paragraph 38 of your declaration if you want to be sure.

A. Okay. (Reading).

Yes, 1999.

Q. Do you think that Kuwahara himself was at least a person of ordinary skill in the art, based on your definition?

A. I believe Kuwahara was a POSITA.

Q. Do you think he was more than a POSITA?

MR. EMERSON: Objection to form.

A. It would be my opinion he seems to have -- again, I do not know Kuwahara, so what I see in the patent is certainly something a POSITA would be able to do, and how much beyond that, I'm not -- I really don't have an opinion on that.

Q. Do you think that Kuwahara knew whether it was possible to create an adaptive antenna approach that simultaneously transmitted multiple signals to different users as of the time he wrote this reference

in 1999?

MR. EMERSON: Objection; calls for speculation.

A. Yes, again, I would not know whether or not he was aware of that.

What I am aware of is the fact that I had published papers back in nineteen ninety -- nineteen -- sorry, 1987 that showed how to take a single system like Kuwahara has, and convert it into a multiple user system.

Q. Well, and Swales itself is from 1990, right?

A. Swales is from 1990.

Q. And Swales presumes that there are such systems out there, right?

A. And there were such systems out there, because I had worked on such systems, along with other people as well.

Q. So why does Kuwahara set itself up in a way where it can only transmit one adaptive array signal to a user at a time?

MR. EMERSON: Object to the form; calls for speculation.

A. Again, I don't know why he only put this into his patent, but that may -- that may have been the -- any time you write a patent, you're focused on solving one particular type of problem, and that apparently is why he -- well, again, I'd just be speculating as to why he did not incorporate a well-known art at that time, as to the fact that you could have taken this and now applied it to a multiple user system.

Q. Kuwahara is trying to address a situation where there is just only one user, right?

A. That's the problem that he was attempting to solve, yes.

Q. So in Kuwahara's world, there's no benefit to have an antenna array that puts out multiple adaptive array signals simultaneously, true?

A. That is not true.

But the specific problem that he is addressing, which is improving the performance of a single user that has interference, for that system, he's

interested only in having a single user out there, and his patent is focused on the performance improvement with that single user.

Q. What I meant when I said in Kuwahara's world in my last question was within the scenario that is discussed in the Kuwahara patent and that the Kuwahara patent is addressed towards. Do you follow me so far?

A. I follow your statement, yes.

Q. Okay. So you stated that going from an approach that can put out only one adaptive beam signal to one that can put out multiple simultaneously can create co-channel interference, right?

A. Can increase the level. Putting out more than one signal has the potential to increase the level of co-channel interference.

Q. And in the scenario that Kuwahara was concerned with, which is just sending a communication to a single user, that kind of increased co-channel interference would be a

detriment, right?

A. Yes.

And, actually, you are creating in such a system, as he described, co-channel interference, but now you have co-channel interference that would be going into other cells, that other users out there that aren't necessarily communicating with your base-station.

Q. And at the same time you would not be benefiting the one user that Kuwahara is concerned with, right?

A. At the same time that you're putting out the signal to yourself you're trying to minimize in -- on the transmit side the amount of -- the amount of interference you're causing into the other users that would be in other base-stations or other cells.

And if the other users similarly use the same technique, they would be reducing the amount of co-channel interference that they were causing into the desired user there, and therefore although

putting nulls in your pattern towards other users actually reduces the amount of signal power that you have relative to the noise in the interference, if everybody plays fair and uses similar techniques, you will see an overall improvement in the performance of such a system, as was well known in the -- in the art at that time.

Q. I didn't follow what exact scenario you were describing there.

What is Kuwahara's system doing in the scenario you were describing?

A. Kuwahara, in a scenario here, he's forming a matrix and looking at a cross-correlated signal information that tried to maximize the signal power on the desired -- towards the desired user. At the same time that he's doing that, any interfering users will have nulls pointing at them. And now when he does that, he's improving the performance of his -- his receiver.

Q. Compared to what?

A. Compared to had he just combined

the signals trying to maximize his own power, which is called maximum ratio combining, in which case you get a nice strong signal or even stronger signal than you would with his technique. However, the interference level would be higher with using maximum ratio combining as opposed to the technique that Kuwahara proposes here.

Q. So you're just comparing a scenario where Kuwahara is not using nulls versus a scenario where Kuwahara is using nulls?

A. Comparing a system that does not have nulls in it to Kuwahara that does have nulls in it.

Q. Okay. But if Kuwahara were modified to simultaneously transmit multiple adaptive beam signals for multiple users simultaneously, that would not benefit the specific use case that Kuwahara was concerned with, which is a single user use case, true?

A. The single user use case that Kuwahara is looking at is one scenario.

But, of course, for cellular systems, that's not the primary scenario that

most operators are interested in. They are interested in increasing the overall capacity of the system, which is to have as many users at high data rates as possible there, so -- and -- yes.

Q. Well, if someone of skill in the art were primarily interested in a multi-user use case environment, does your declaration explain why that person would start with Kuwahara as their primary reference?

A. In the declaration, I explain how Kuwahara could be used to reduce interference by placing nulls in particular directions, and a POSITA would understand that that means that improves the performance whether or not those other users are in your cell or in an adjacent cell.

Q. Improves the performance over a system that doesn't use nulls?

A. Yes. By putting in -- by putting in the nulls, Kuwahara's system is improving the performance of that particular user.

Q. What aspect of Figure 3 in Kuwahara is responsible for generating the nulls?

A. In Figure 3, we see the Search receiver logic element 106 correlation matrix estimation. Once you have that correlation matrix estimation, you can go through and do an interference subspace estimation. And as we said, as is known in box 107, box 108 has the signal subspace estimation, and so from the interference subspace and the signal subspace, one can calculate, as is done in the array control for downlink box 109, what -- how to put nulls and beams towards the desired user, nulls towards the interference.

Q. If Kuwahara were to be adapted to simultaneously transmit multiple adaptive beams for multiple users, then the null-forming aspect of boxes 106, 107, 108 and 109 would all have to be modified?

A. Those boxes would have to -- to accommodate multiple users, there are various options that can be done there.

One of the options, potential changes that would be, would simply be to duplicate the software or hardware, the processing that's done by those boxes.

There are -- there were subsequent -- there were other -- there are other techniques that can actually improve the performance further over just doing those independently, and in that case, modification of those individual boxes could be done to provide even further enhancement of the performance.

Q. So there are a bunch of different options out there, right?

A. There are -- there are a number of different approaches to improving the -- or to take a single user system and take it into a multi-user system.

For example, the approach that I'm talking about here, which is just duplicating the processing that's done for each one, is the process that I looked at in a paper that I wrote in 1987. So just this as an example of how you would go from a single user to a multiple user system.

Papers subsequent to that, particularly papers written in the 1990s, showed how you could even better performance

(sic) by adding additional enhancements, which require modifications of those boxes, other than just duplicating the process.

MR. NOROOZI: I have no further questions at this time.

MR. EMERSON: Okay. We'll take a quick break, and we'll be back.

MR. NOROOZI: Sure.

(Recess taken.)

MR. EMERSON: Sorry about that. We're done. We'll read and sign, and that's all.

(Time noted: 1:44 p.m.)

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JACK H. WINTERS, Ph.D.

Subscribed and sworn to before me this ___ day of _____, 2018.

_____

C E R T I F I C A T E

STATE OF NEW YORK)
: ss.
COUNTY OF NEW YORK)

I, SHAUNA STOLTZ-LAURIE, a Shorthand Reporter and Notary Public within and for the State of New York, do hereby certify:

That JACK H. WINTERS, Ph.D., the witness whose deposition is hereinbefore set forth, was duly sworn and that such deposition is a true record of the testimony of 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 12th day of November, 2018.

_____

SHAUNA STOLTZ-LAURIE

*** ERRATA SHEET ***
TRANSPERFECT LEGAL SERVICES

NAME OF CASE: CISCO v XR COMMUNICATIONS
DATE OF DEPOSITION: NOVEMBER 9, 2018
NAME OF WITNESS: JACK H. WINTERS, Ph.D.

Reason codes:
1. To clarify the record.
2. To conform to the facts.
3. To correct transcription errors.

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JACK H. WINTERS, Ph.D.

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