UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
HTC CORPORATION AND HTC AMERICA, INC.,
ZTE (USA) INC.,
Petitioners
v.
INVT SPE LLC,
Patent Owner

Case No. IPR2018-01476
U.S. Patent No. 7,764,711

Deposition of BRANIMIR VOJCIC, D.SC., a witness herein, called for examination by counsel for Apple Inc. in the above-entitled matter, pursuant to notice, the witness being duly sworn by KAREN YOUNG, a Notary Public in and for the Commonwealth of Virginia, taken at the Hilton Garden Inn, 8301 Boone Boulevard, Vienna, Virginia, at 9:05 a.m. on Wednesday, October 23, 2019, and the proceedings being taken down by Stenotype and transcribed by KAREN YOUNG.

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C O N T E N T S

THE WITNESS:
BRANIMIR VOJCIC, D.SC.
By Mr. Hart..... 5

E X H I B I T S

EXHIBIT NO. PAGE NO.
Exhibit 1001 U.S. Patent No. 7,764,711..... 5
Exhibit 1005 U.S. Patent No. 6,067,290..... 5
Exhibit 2001 Joint Disputed Proposed Claim Terms for Construction..... 18
Exhibit 2002 Declaration of Branimir Vojcic. 6

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(Exhibits attached to the original transcript)

Page 5

PROCEEDINGS
(WHEREIN, Exhibits 1001, 1005, 2001 and 2002 were premarked for identification by counsel.)
Whereupon,
BRANIMIR VOJCIC, D.SC.,
called for examination by counsel for Apple Inc. and having been duly sworn by the Notary Public, was examined and testified as follows:
- - -
EXAMINATION BY COUNSEL FOR APPLE INC.
QUESTIONS BY MR. HART:

Q. Good morning, Dr. Vojcic.
A. Good morning, Counsel.
Q. Can you please state your full name for the record?
A. Branimir Vojcic.
Q. Are there any medical or other reasons you would be unable to answer my questions fully and honestly today?
A. No.
Q. I'm going to hand you a few exhibits I've pre-marked. The first is Exhibit 1001. That is the '711 patent challenged in this matter. The second is Exhibit 1005, Paulraj prior art reference

Page 6

issue in this matter, and the third is Exhibit 2002. That is your declaration submitted in this matter. You're familiar with all three of these pre-marked exhibits, correct?
A. Yes, I am.
Q. Let's start with the '711 patent, Exhibit 1001, and let's go to claim 1. All right. I'd like to walk through the three limitations of claim 1 in the '711 patent. So let's start with mapping section. Claim 1 limitation that we've referred to as 1A reads, "A mapping section that maps the plurality of data items to at least one of the plurality of antennas." Do you see that?
A. I do.
Q. So this first limitation requires both a plurality of data items and a plurality of antennas; is that correct?
A. That's correct.
Q. And it also requires the plurality of data items are mapped to at least one of the plurality of antennas, correct?
A. That's correct.
Q. Does this limitation require any data items mapped to different antennas?
A. No, at least one of the plurality.

Page 7

Q. Let's go to the next limitation, which states, "A transmitting section that transmits the plurality of data items using the at least one of the plurality of antennas to the receiving apparatus." Do you see that?
A. Yes, I do.
Q. Okay. So this second limitation requires transmitting the plurality of data from whichever antennas data was mapped to in the first limitation; is that correct?
A. Just a moment.
Q. Sure.
A. That's correct.
Q. So this limitation also doesn't require any data items transmitted from different antennas, does it?
A. It doesn't, but allow -- allows.
Q. Understood. Moving on to the third limitation, which I'll read in for the record, states, "Wherein the mapping section generates a replica data item by replicating a specific data item of the plurality of data items and maps the plurality of data items to the at least one of the plurality of antennas such that the specific data item and the replica data item are transmitted from

Page 8

different antennas at the same time." Do you see that?
A. I do.
Q. So this final limitation introduces a specific data item; is that correct?
A. That's correct.
Q. And that is part of the plurality of data items we've seen from earlier in the claim; is that right?
A. That's correct.
Q. And this final limitation also states that the specific data item is replicated; is that right?
A. That is correct.
Q. And it requires that the specific data item and its replica are transmitted simultaneously from different antennas, correct?
A. That's correct.
Q. Now, in your declaration submitted in this matter, I believe you refer to that concept as transmit diversity. Am I correct about that?
A. Probably.
Q. Okay.
A. I'm familiar with that concept. I'm not sure if I mentioned in the declaration, but yes, if

Page 9

you transmit a replica of one data item on another antenna, that's definitely considered in the art transmit diversity.

Q. Great. Does this final limitation in claim 1 require any data other than the specific data item and its replica be transmitted in any particular way?

A. Could you repeat the question please?

Q. Sure. Does this final limitation in claim 1 require any data other than the specific data item and its replica be transmitted in any particular way?

A. Not beyond what was required in the previous limitation.

Q. And just for clarity, the final limitation, to the extent it imposes specific limitations on how data is transmitted, it's just with respect to the specific data item and its replica; is that correct?

A. I wouldn't phrase it exactly like that, but I would say it -- it further specifies how one of the specific data item out of the multiple data items is transmitted in relation to its replica and previous limitations as you could transmit those data items on at least one of the antennas.

Page 10

Q. Okay. Are data items other than the specific data item and its replica addressed by the final limitation of claim 1?

A. No.

Q. Okay. Can I have you reference your declaration in this matter, Exhibit 2002, and specifically paragraph 30? In paragraph 30, you discuss a concept referred to as spatial multiplexing. Do you see that?

A. Yes, I do.

Q. Okay, and you state that spatial multiplexing involves utilizing different antennas to transmit different data through multiple antennas in parallel; is that correct?

A. That's -- I don't see that here. Yes, yes, that's I guess from the -- from the preamble. Let me see. That's how generally it's understood in the art, but I think that's part of phrasing the preamble.

Q. Okay, so the sentence I read is the general understanding of spatial multiplexing in the art; is that correct?

A. Correct.

Q. And spatial multiplexing is different from transmit diversity, correct?

Page 11

A. It is considered to be different.

Q. Transmit diversity is not a subset of spatial multiplexing, is it?

A. Yeah, I don't know what you mean by subset. They're different.

Q. Okay. When you say transmit different data through multiple antennas in parallel, does this mean transmitting different data using different antennas at the same time?

A. Yes, they're using different antennas at the same time, and I would say also at the same -- in the same resources, frequency resources.

Q. So spatial multiplexing involves energy representing bits from one data item radiated from a first antenna at the same time energy representing bits from a second data item are radiated from a second antenna; is that correct?

A. That -- that could be, yes, that could be one typical way of doing spatial multiplexing.

Q. If we go back one paragraph in your declaration, Exhibit 2002, to paragraph 29, the first sentence states, "The claims of the '711 patent impose spatial multiplexing transmission and transmit diversity at the same time." Do you see that?

Page 12

A. Yes, I do, first sentence, yeah.

Q. Is it your opinion that additional data that is not the specific data item or its replica must be transmitted simultaneously with the specific data item and its replica to satisfy the claims of the '711 patent?

A. I'm sorry, you need to repeat again.

Q. Sure. So we've talked about how the final limitation of claim 1 requires a specific data item and its replica simultaneously transmitted across different antennas, correct?

A. That's correct.

Q. Does claim 1 require transmitting other data simultaneously with the transmission of the specific data item and its replica?

A. Yes, that's my understanding.

Q. So you believe that at least claim 1 of the '711 patent requires at least three data items transmitted simultaneously, the specific data item, its replica and something else.

A. And one or more other data items, yes.

Q. What claim limitation in claim 1 sets forth that requirement, that at least three things are transmitted simultaneously?

A. I think -- well, multiple limitations. I

Page 13

think there is plurality of data items that needs to be transmitted from one or more antennas from the preamble in limitation 1, and maybe -- and also limitation 2, transmitting limitation, and so that's at least two data items. And then the mapping section further generates a replica data item of one of the -- of one of the plurality of data items, so that's the third one.

Q. So when we first talked about the limitation A in claim 1 and limitation B in claim 1, I believe you testified that those limitations did not require the plurality of data items to be sent on more than one antenna. Rather, those limitations simply require that multiple items are sent on at least one antenna; is that correct?

A. That's correct.

Q. And the -- I believe you testified that the specific data item is part of the plurality of data items; is that correct?

A. If I said that, I didn't mean that. I -- oh, specific data item, yes.

Q. Specific --

A. Specific data item, yes, correct.

Q. So can you explain to me again how claim 1 requires the specific data item, its replica and

Page 14

something else be transmitted simultaneously?

A. Okay, let me read the whole claim once again. So could you repeat the question please?

Q. Sure. Can you explain to me again how claim 1 requires the specific data item, its replica and something else be transmitted simultaneously?

A. The first -- first we explain how preamble is defining this minor system, transmitting a plurality of data items in parallel from multiple antennas in parallel of plurality of antennas. Then the next section says mapping the plurality of those data items to at least one of the plurality of antennas. So we have at least two data items now.

Then further -- further, the mapping section has an additional function that it performs that it generates in addition to those data items that it mapped, generates a replica data item, so that means that's at least three, and further, it clarifies, even though previous limitations said that those data -- plurality of data items are transmitted in parallel, which I think a POSITA would understand at the same time on the same resources, now the third limitation also says that

Page 15

even if additional replica data item is transmitted at the same time its specific data item from which it's replicated. I think it's -- that particular arrangement is consistent with one of the -- with one of the embodiments. Yeah, for example, embodiment of figure 4, we have the first antenna and the first time interval data 1, while on -- on antenna 2, we have data 2. That's not necessarily required by a claim, but -- but it's allowed by the claim such an arrangement, and -- and then we also have transmission data on -- on these antennas in addition.

Q. So I'd like to walk back through the limitations of claim 1. Let's set aside the preamble for now.

A. Okay.

Q. The first limitation, 1. A, mapping section that maps the plurality of data items to at least one of the plurality of antennas. If I have a stream of multiple data items transmitted from one of two antennas, have I satisfied the first limitation and the second limitation?

A. I don't know what you mean by if you have a stream of plurality of data items from one antenna. What do you mean by stream?

Page 16

Q. In series, data items.

A. Oh, one -- one after the other.

Q. Correct.

A. Serially.

Q. Separated in time.

A. If you consider that limitation in isolation, which I don't believe is a proper way to read limitations in isolation, a lot of claim limitations and perhaps preamble, if it is so limiting, then it would be correct, but -- but I don't think it's very meaningful to consider just one claim limitation in isolation.

Q. I'm trying to make sure we're on the same page with respect to the specific words used in the claim, and we can come back and talk about what impact the preamble may have on the claim, but for now I want to make sure we have an understanding as to what the claim language actually says. So just to be clear, the first two limitations, the mapping section and the transmitting section, if we have a stream of -- serial stream of data items transmitted one after the other on one of two antennas, we have satisfied the express language of those first two limitations, correct?

A. I'm not sure about that. Let me think

Page 17

about that. I don't think -- because it already defines -- it's already using antecedent basis by saying the plurality of data items. So I couldn't -- I don't think POSITA would consider that in isolation of what was already -- what has been already defined in the preamble, and -- and in the preamble, it says that these plurality of data items are transmitted in parallel. So by having that in mind, I don't -- I think POSITA would not understand that these are in serial.

Q. Am I correct that the final limitation of claim 1 does require the specific data item and its replica transmitted in parallel?

A. I think, if I understood your question correctly, the answer would be yes, the specific data item and its replica are transmitted in parallel, yes.

Q. And the claim allows for multiple pieces of data to be considered specific data items over time, correct?

A. I don't know. Let me -- what do you mean, over time?

Q. So if a transmitting apparatus consistent with claim 1 of the '711 patent is transmitting a variety of data over time, does the claim allow for

Page 18

different data items to be characterized as specific data items such that they are replicated and sent in parallel with their replicas?

A. I don't think claim -- claim considers what could generally be done over time. It's really I think directed to what's -- what's done or what's the apparatus arrangement at a given time, so -- and at a given time, it's -- we have to elaborate how it's done.

Q. I'm going to hand you what's been marked in this proceeding as Exhibit 2001.

A. Thank you.

Q. This is the joint disputed proposed claim terms for construction in the parallel ITC investigation. Counsel, I don't have an extra copy of this. We're just looking at the agreed-upon construction for the preamble.

MR. HARTING: Preamble.

BY MR. HART:

Q. Yeah, if you don't mind sharing with Dr. Vojcic, that would be great. Dr. Vojcic, could you turn to page what's labeled 1 of 9, the very beginning of the chart in Exhibit 2001?

A. I'm there.

Q. Okay. Are you familiar with this

Page 19

document?

A. I'm not hundred percent sure. I mean, I know I saw some claim construction before, so not sure if it's exactly the same, but I was familiarized with claim construction regarding this at some point.

Q. The second row of the chart on page 1 of 9 in this exhibit, it lists the preamble from claims 1, 2 and 4 of the '711 patent. Do you see that?

A. You mean first row?

Q. Well, first row under the heading.

A. Yeah, yeah, yeah.

Q. The title row.

A. I understand.

Q. Okay. And in the right column, it notes that there's an agreed construction for that preamble. Do you see that? Specifically, quote, "Multiple antenna apparatus which transmits multiple data items," paren, "transmission data," end paren, "at the same time and at the same frequency using multiple antennas," end quote?

A. I do.

Q. Do you agree with that interpretation of the preamble, the claims of the '711 patent?

Page 20

A. Yeah, generally I do. I mean, I agree that's how MIMO would be understood in the art where this essentially at the same time and the same frequency question depends on the context of the system and specific realization, system realization, doesn't necessarily mean to be hundred percent at the same time or hundred percent on the same frequencies, but there is a transmission at the same time and on the same frequencies in that arrangement.

Q. And just so -- make sure I understood your answer correctly, are you saying that the preamble doesn't require the claim device to transmit multiple data items at the same time 100 percent of the time?

A. That too could be the case. MIMO apparatus -- you know, POSITA treats that he considers everything that's available in the part, how -- you know, how to understand the term, and it is true that there were MIMO apparata that are capable of doing multiple data items from different antennas at the same time, but sometimes they -- for some reason, they might not. They would just do one data item. There is no more to transmit, for example, whatever it is.

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