

Page 1

1 UNITED STATES PATENT AND TRADEMARK OFFICE
 2 _____
 3 BEFORE THE PATENT TRIAL AND APPEAL BOARD
 4 _____
 5 APPLE INC.,
 6 HTC CORPORATION AND HTC AMERICA, INC.,
 7 ZTE (USA) INC.,
 8 Petitioners
 9 v.
 10 INVT SPE LLC,
 11 Patent Owner
 12 _____
 13 Case No. IPR2018-01476
 14 U.S. Patent No. 7,764,711
 15
 16 Deposition of BRANIMIR VOJCIC, D.SC., a
 17 witness herein, called for examination by counsel
 18 for Apple Inc. in the above-entitled matter,
 19 pursuant to notice, the witness being duly sworn by
 20 KAREN YOUNG, a Notary Public in and for the
 21 Commonwealth of Virginia, taken at the Hilton
 22 Garden Inn, 8301 Boone Boulevard, Vienna, Virginia,
 23 at 9:05 a.m. on Wednesday, October 23, 2019, and
 24 the proceedings being taken down by Stenotype and
 25 transcribed by KAREN YOUNG.

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1 C O N T E N T S
 2 THE WITNESS:
 3 BRANIMIR VOJCIC, D.SC.
 4 By Mr. Hart..... 5
 5
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 7
 8
 9
 10
 11 E X H I B I T S
 12 EXHIBIT NO. PAGE NO.
 13 Exhibit 1001 U.S. Patent No. 7,764,711..... 5
 14 Exhibit 1005 U.S. Patent No. 6,067,290..... 5
 15 Exhibit 2001 Joint Disputed Proposed Claim
 16 Terms for Construction..... 18
 17 Exhibit 2002 Declaration of Branimir Vojcic. 6
 18
 19
 20
 21 - - -
 22
 23 (Exhibits attached to the original transcript)
 24
 25

1 PROCEEDINGS
 2 (WHEREIN, Exhibits 1001, 1005, 2001 and
 3 2002 were premarked for identification by counsel.)
 4 Whereupon,
 5 BRANIMIR VOJCIC, D.SC.,
 6 called for examination by counsel for
 7 Apple Inc. and having been duly
 8 sworn by the Notary Public, was examined
 9 and testified as follows:
 10 - - -
 11 EXAMINATION BY COUNSEL FOR APPLE INC.
 12 QUESTIONS BY MR. HART:
 13 **Q. Good morning, Dr. Vojcic.**
 14 A. Good morning, Counsel.
 15 **Q. Can you please state your full name for**
 16 **the record?**
 17 A. Branimir Vojcic.
 18 **Q. Are there any medical or other reasons**
 19 **you would be unable to answer my questions fully**
 20 **and honestly today?**
 21 A. No.
 22 **Q. I'm going to hand you a few exhibits I've**
 23 **pre-marked. The first is Exhibit 1001. That is**
 24 **the '711 patent challenged in this matter. The**
 25 **second is Exhibit 1005, Paulraj prior art reference**

1 issue in this matter, and the third is Exhibit
 2 2002. That is your declaration submitted in this
 3 matter. You're familiar with all three of these
 4 pre-marked exhibits, correct?
 5 A. Yes, I am.
 6 **Q. Let's start with the '711 patent, Exhibit**
 7 **1001, and let's go to claim 1. All right. I'd**
 8 **like to walk through the three limitations of claim**
 9 **1 in the '711 patent. So let's start with mapping**
 10 **section. Claim 1 limitation that we've referred to**
 11 **as 1A reads, "A mapping section that maps the**
 12 **plurality of data items to at least one of the**
 13 **plurality of antennas." Do you see that?**
 14 A. I do.
 15 **Q. So this first limitation requires both a**
 16 **plurality of data items and a plurality of**
 17 **antennas; is that correct?**
 18 A. That's correct.
 19 **Q. And it also requires the plurality of**
 20 **data items are mapped to at least one of the**
 21 **plurality of antennas, correct?**
 22 A. That's correct.
 23 **Q. Does this limitation require any data**
 24 **items mapped to different antennas?**
 25 A. No, at least one of the plurality.

1 **Q. Let's go to the next limitation, which**
 2 **states, "A transmitting section that transmits the**
 3 **plurality of data items using the at least one of**
 4 **the plurality of antennas to the receiving**
 5 **apparatus." Do you see that?**
 6 A. Yes, I do.
 7 **Q. Okay. So this second limitation requires**
 8 **transmitting the plurality of data from whichever**
 9 **antennas data was mapped to in the first**
 10 **limitation; is that correct?**
 11 A. Just a moment.
 12 **Q. Sure.**
 13 A. That's correct.
 14 **Q. So this limitation also doesn't require**
 15 **any data items transmitted from different antennas,**
 16 **does it?**
 17 A. It doesn't, but allow -- allows.
 18 **Q. Understood. Moving on to the third**
 19 **limitation, which I'll read in for the record,**
 20 **states, "Wherein the mapping section generates a**
 21 **replica data item by replicating a specific data**
 22 **item of the plurality of data items and maps the**
 23 **plurality of data items to the at least one of the**
 24 **plurality of antennas such that the specific data**
 25 **item and the replica data item are transmitted from**

1 **different antennas at the same time." Do you see**
 2 **that?**
 3 A. I do.
 4 **Q. So this final limitation introduces a**
 5 **specific data item; is that correct?**
 6 A. That's correct.
 7 **Q. And that is part of the plurality of data**
 8 **items we've seen from earlier in the claim; is that**
 9 **right?**
 10 A. That's correct.
 11 **Q. And this final limitation also states**
 12 **that the specific data item is replicated; is that**
 13 **right?**
 14 A. That is correct.
 15 **Q. And it requires that the specific data**
 16 **item and its replica are transmitted simultaneously**
 17 **from different antennas, correct?**
 18 A. That's correct.
 19 **Q. Now, in your declaration submitted in**
 20 **this matter, I believe you refer to that concept as**
 21 **transmit diversity. Am I correct about that?**
 22 A. Probably.
 23 **Q. Okay.**
 24 A. I'm familiar with that concept. I'm not
 25 sure if I mentioned in the declaration, but yes, if

<p style="text-align: right;">Page 9</p> <p>1 you transmit a replica of one data item on another 2 antenna, that's definitely considered in the art 3 transmit diversity. 4 Q. Great. Does this final limitation in 5 claim 1 require any data other than the specific 6 data item and its replica be transmitted in any 7 particular way? 8 A. Could you repeat the question please? 9 Q. Sure. Does this final limitation in 10 claim 1 require any data other than the specific 11 data item and its replica be transmitted in any 12 particular way? 13 A. Not beyond what was required in the 14 previous limitation. 15 Q. And just for clarity, the final 16 limitation, to the extent it imposes specific 17 limitations on how data is transmitted, it's just 18 with respect to the specific data item and its 19 replica; is that correct? 20 A. I wouldn't phrase it exactly like that, 21 but I would say it -- it further specifies how one 22 of the specific data item out of the multiple data 23 items is transmitted in relation to its replica and 24 previous limitations as you could transmit those 25 data items on at least one of the antennas.</p>	<p style="text-align: right;">Page 11</p> <p>1 A. It is considered to be different. 2 Q. Transmit diversity is not a subset of 3 spatial multiplexing, is it? 4 A. Yeah, I don't know what you mean by 5 subset. They're different. 6 Q. Okay. When you say transmit different 7 data through multiple antennas in parallel, does 8 this mean transmitting different data using 9 different antennas at the same time? 10 A. Yes, they're using different antennas at 11 the same time, and I would say also at the same -- 12 in the same resources, frequency resources. 13 Q. So spatial multiplexing involves energy 14 representing bits from one data item radiated from 15 a first antenna at the same time energy 16 representing bits from a second data item are 17 radiated from a second antenna; is that correct? 18 A. That -- that could be, yes, that could be 19 one typical way of doing spatial multiplexing. 20 Q. If we go back one paragraph in your 21 declaration, Exhibit 2002, to paragraph 29, the 22 first sentence states, "The claims of the '711 23 patent impose spatial multiplexing transmission and 24 transmit diversity at the same time." Do you see 25 that?</p>
<p style="text-align: right;">Page 10</p> <p>1 Q. Okay. Are data items other than the 2 specific data item and its replica addressed by the 3 final limitation of claim 1? 4 A. No. 5 Q. Okay. Can I have you reference your 6 declaration in this matter, Exhibit 2002, and 7 specifically paragraph 30? In paragraph 30, you 8 discuss a concept referred to as spatial 9 multiplexing. Do you see that? 10 A. Yes, I do. 11 Q. Okay, and you state that spatial 12 multiplexing involves utilizing different antennas 13 to transmit different data through multiple 14 antennas in parallel; is that correct? 15 A. That's -- I don't see that here. Yes, 16 yes, that's I guess from the -- from the preamble. 17 Let me see. That's how generally it's understood 18 in the art, but I think that's part of phrasing the 19 preamble. 20 Q. Okay, so the sentence I read is the 21 general understanding of spatial multiplexing in 22 the art; is that correct? 23 A. Correct. 24 Q. And spatial multiplexing is different 25 from transmit diversity, correct?</p>	<p style="text-align: right;">Page 12</p> <p>1 A. Yes, I do, first sentence, yeah. 2 Q. Is it your opinion that additional data 3 that is not the specific data item and its replica 4 must be transmitted simultaneously with the 5 specific data item and its replica to satisfy the 6 claims of the '711 patent? 7 A. I'm sorry, you need to repeat again. 8 Q. Sure. So we've talked about how the 9 final limitation of claim 1 requires a specific 10 data item and its replica simultaneously 11 transmitted across different antennas, correct? 12 A. That's correct. 13 Q. Does claim 1 require transmitting other 14 data simultaneously with the transmission of the 15 specific data item and its replica? 16 A. Yes, that's my understanding. 17 Q. So you believe that at least claim 1 of 18 the '711 patent requires at least three data items 19 transmitted simultaneously, the specific data item, 20 its replica and something else. 21 A. And one or more other data items, yes. 22 Q. What claim limitation in claim 1 sets 23 forth that requirement, that at least three things 24 are transmitted simultaneously? 25 A. I think -- well, multiple limitations. I</p>

<p style="text-align: right;">Page 13</p> <p>1 think there is plurality of data items that needs 2 to be transmitted from one or more antennas from 3 the preamble in limitation 1, and maybe -- and also 4 limitation 2, transmitting limitation, and so 5 that's at least two data items. And then the 6 mapping section further generates a replica data 7 item of one of the -- of one of the plurality of 8 data items, so that's the third one.</p> <p>9 Q. So when we first talked about the 10 limitation A in claim 1 and limitation B in claim 11 1, I believe you testified that those limitations 12 did not require the plurality of data items to be 13 sent on more than one antenna. Rather, those 14 limitations simply require that multiple items are 15 sent on at least one antenna; is that correct?</p> <p>16 A. That's correct.</p> <p>17 Q. And the -- I believe you testified that 18 the specific data item is part of the plurality of 19 data items; is that correct?</p> <p>20 A. If I said that, I didn't mean that. I -- 21 oh, specific data item, yes.</p> <p>22 Q. Specific --</p> <p>23 A. Specific data item, yes, correct.</p> <p>24 Q. So can you explain to me again how claim 25 1 requires the specific data item, its replica and</p>	<p style="text-align: right;">Page 15</p> <p>1 even if additional replica data item is transmitted 2 at the same time its specific data item from which 3 it's replicated. I think it's -- that particular 4 arrangement is consistent with one of the -- with 5 one of the embodiments. Yeah, for example, 6 embodiment of figure 4, we have the first antenna 7 and the first time interval data 1, while on -- on 8 antenna 2, we have data 2. That's not necessarily 9 required by a claim, but -- but it's allowed by the 10 claim such an arrangement, and -- and then we also 11 have transmission data on -- on these antennas in 12 addition.</p> <p>13 Q. So I'd like to walk back through the 14 limitations of claim 1. Let's set aside the 15 preamble for now.</p> <p>16 A. Okay.</p> <p>17 Q. The first limitation, 1. A, mapping 18 section that maps the plurality of data items to at 19 least one of the plurality of antennas. If I have 20 a stream of multiple data items transmitted from 21 one of two antennas, have I satisfied the first 22 limitation and the second limitation?</p> <p>23 A. I don't know what you mean by if you have 24 a stream of plurality of data items from one 25 antenna. What do you mean by stream?</p>
<p style="text-align: right;">Page 14</p> <p>1 something else be transmitted simultaneously?</p> <p>2 A. Okay, let me read the whole claim once 3 again. So could you repeat the question please?</p> <p>4 Q. Sure. Can you explain to me again how 5 claim 1 requires the specific data item, its 6 replica and something else be transmitted 7 simultaneously?</p> <p>8 A. The first -- first we explain how 9 preamble is defining this minor system, 10 transmitting a plurality of data items in parallel 11 from multiple antennas in parallel of plurality of 12 antennas. Then the next section says mapping the 13 plurality of those data items to at least one of 14 the plurality of antennas. So we have at least two 15 data items now.</p> <p>16 Then further -- further, the mapping 17 section has an additional function that it performs 18 that it generates in addition to those data items 19 that it mapped, generates a replica data item, so 20 that means that's at least three, and further, it 21 clarifies, even though previous limitations said 22 that those data -- plurality of data items are 23 transmitted in parallel, which I think a POSITA 24 would understand at the same time on the same 25 resources, now the third limitation also says that</p>	<p style="text-align: right;">Page 16</p> <p>1 Q. In series, data items.</p> <p>2 A. Oh, one -- one after the other.</p> <p>3 Q. Correct.</p> <p>4 A. Serially.</p> <p>5 Q. Separated in time.</p> <p>6 A. If you consider that limitation in 7 isolation, which I don't believe is a proper way to 8 read limitations in isolation, a lot of claim 9 limitations and perhaps preamble, if it is so 10 limiting, then it would be correct, but -- but I 11 don't think it's very meaningful to consider just 12 one claim limitation in isolation.</p> <p>13 Q. I'm trying to make sure we're on the same 14 page with respect to the specific words used in the 15 claim, and we can come back and talk about what 16 impact the preamble may have on the claim, but for 17 now I want to make sure we have an understanding as 18 to what the claim language actually says. So just 19 to be clear, the first two limitations, the mapping 20 section and the transmitting section, if we have a 21 stream of -- serial stream of data items 22 transmitted one after the other on one of two 23 antennas, we have satisfied the express language of 24 those first two limitations, correct?</p> <p>25 A. I'm not sure about that. Let me think</p>

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

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

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

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

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

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

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

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

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

12 A. Thank you.

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

18 MR. HARTING: Preamble.

19 BY MR. HART:

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

24 A. I'm there.

25 **Q. Okay. Are you familiar with this**

1 **document?**

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

7 **Q. The second row of the chart on page 1 of**
8 **9 in this exhibit, it lists the preamble from**
9 **claims 1, 2 and 4 of the '711 patent. Do you see**
10 **that?**

11 A. You mean first row?

12 **Q. Well, first row under the heading.**

13 A. Yeah, yeah, yeah.

14 **Q. The title row.**

15 A. I understand.

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

23 A. I do.

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

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

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

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

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