

Deposition of
Marwan Hassoun, Ph.D., MS
September 11, 2024

Qualcomm
vs.
Network System Technologies



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<p style="text-align: right;">Page 1</p> <p>1 UNITED STATES PATENT AND TRADEMARK OFFICE</p> <p>2 BEFORE THE PATENT TRIAL AND APPEAL BOARD</p> <p>3</p> <p>4 QUALCOMM INCORPORATED and SAMSUNG</p> <p>5 ELECTRONICS CO., LTD.,</p> <p>6</p> <p>7 Petitioners,</p> <p>8</p> <p>9 IPR No. 2024-00343</p> <p>10 vs. U.S. PATENT NO. 7,594,052</p> <p>11 NETWORK SYSTEM TECHNOLOGIES, LLC</p> <p>12 Patent Owner.</p> <p>13</p> <p>14 DEPOSITION REMOTELY TAKEN VIA ZOOM CONFERENCE OF</p> <p>15 MARWAN HASSOUN, PH.D., MS</p> <p>16 WEDNESDAY, SEPTEMBER 11, 2024</p> <p>17</p> <p>18</p> <p>19</p> <p>20</p> <p>21</p> <p>22</p> <p>23 Stenographically Reported by:</p> <p>24 Linda E. Marquette</p> <p>25 RPR, CLR, CA CSR No. 11874; UT No. 13725361-7801</p> <p>Job No. 10147601</p>	<p style="text-align: right;">Page 3</p> <p>1 APPEARANCES:</p> <p>2 (All parties appearing remotely.)</p> <p>3</p> <p>4</p> <p>5 For Petitioners:</p> <p>6 BY: DEREK VANDENBURGH, ESQ.</p> <p>7 BY: AARON W. PEDERSON, ESQ.</p> <p>8 CARLSON CASPERS VANDENBURGH & LINDQUIST, P.A.</p> <p>9 225 South Sixth Street</p> <p>10 Suite 4200</p> <p>11 Minneapolis, Minnesota 55402</p> <p>12 612.436.9600</p> <p>13 dvandenburg@carlsoncaspers.com</p> <p>14 apederson@carlsoncaspers.com</p> <p>15</p> <p>16 For Patent Owner Network System Technologies:</p> <p>17 BY: ANGELO CHRISTOPHER, ESQ.</p> <p>18 BY: PETER KRUSIEWICZ, ESQ.</p> <p>19 NIXON PEABODY LLP</p> <p>20 70 West Madison Street</p> <p>21 Chicago, Illinois 60602</p> <p>22 312.977.4473</p> <p>23 achristopher@nixonpeabody.com</p> <p>24 pkrusiewicz@nixonpeabody.com</p> <p>25</p> <p>ALSO PRESENT:</p> <p>Chris Landrum, Zoom host</p>
<p style="text-align: right;">Page 2</p> <p>1 UNITED STATES PATENT AND TRADEMARK OFFICE</p> <p>2 BEFORE THE PATENT TRIAL AND APPEAL BOARD</p> <p>3</p> <p>4 QUALCOMM INCORPORATED and SAMSUNG</p> <p>5 ELECTRONICS CO., LTD.,</p> <p>6</p> <p>7 Petitioners,</p> <p>8</p> <p>9 IPR No. IPR2024-00343</p> <p>10 vs. U.S. PATENT NO. 7,594,052</p> <p>11 NETWORK SYSTEM TECHNOLOGIES, LLC</p> <p>12 Patent Owner.</p> <p>13</p> <p>14 DEPOSITION REMOTELY TAKEN VIA ZOOM CONFERENCE OF</p> <p>15 MARWAN HASSOUN, PH.D., MS, taken on behalf of Patent</p> <p>16 Owner, with everyone appearing at their remote address,</p> <p>17 and the witness appearing at Minneapolis, Minnesota,</p> <p>18 commencing at 9:34 a.m. (EST), and concluding at 5:28</p> <p>19 p.m. (EST), on Wednesday, September 11, 2024, before</p> <p>20 Linda E. Marquette, RPR, CLR, CA Certified Shorthand</p> <p>21 Reporter No. 11874 and UT No. 13725361-7801.</p>	<p style="text-align: right;">Page 4</p> <p>1 I N D E X</p> <p>2 WITNESS: PAGE</p> <p>3 MARWAN HASSOUN, PH.D., MS</p> <p>4 EXAMINATION BY MR. CHRISTOPHER 7</p> <p>5 EXAMINATION BY MR. VANDENBURGH 141</p> <p>6 FURTHER EXAMINATION BY MR. CHRISTOPHER 144</p> <p>7</p> <p>8 PREVIOUSLY MARKED EXHIBITS</p> <p>9 NO. DESCRIPTION PAGE</p> <p>10 Exhibit 1003 11</p> <p>11 Declaration of Dr. Marwan Hassoun in</p> <p>12 Support of Petition for Inter Partes</p> <p>13 Review of U.S. Patent No. 7,594,052 (174</p> <p>14 pages)</p> <p>15 Exhibit 1001 15</p> <p>16 United States Patent Radulescu et al.</p> <p>17 No. US 7,594,052 B2 dated 9/22/2009 (10</p> <p>18 pages)</p> <p>19 Exhibit 1006 72</p> <p>20 OCP International Partnership Open Core</p> <p>21 Protocol Specification (202 pages)</p> <p>22 Exhibit 1005 83</p> <p>23 An Efficient On-Chip Network Interface</p> <p>24 Offering Guaranteed Services,</p> <p>25 Shared-Memory Abstraction, and Flexible</p> <p>Network Configuration article (6 pages)</p> <p>Exhibit 1007 100</p> <p>United States Patent Application</p> <p>Publication dated 9/12/2002 by Weber (31</p> <p>pages)</p> <p>Exhibit 1021 133</p> <p>A generic architecture for on-chip</p> <p>packet-switched interconnections</p> <p>abstract paper (9 pages)</p>

<p>1 *** (All previously marked exhibits 2 are NOT to be attached to this 3 deposition per counsel's request.) 4 5 6 7 8 WITNESS INSTRUCTED NOT TO ANSWER 9 (NONE) 10 11 12 13 14 15 16 REQUESTED INFORMATION 17 (NONE) 18 19 20 21 22 23 24 25</p>	<p style="text-align: right;">Page 5</p> <p>1 We also have on the Zoom also the patent owner 2 Peter Krusiewicz. 3 MR. VANDENBURGH: And this is Derek 4 Vandenburg representing Qualcomm. 5 And also with me today is Aaron Pederson. We 6 are both with the Carlson Caspers firm. 7 8 MARWAN HASSOUN, PH.D., MS, 9 having been first duly administered an oath remotely, 10 was examined and testified as follows: 11 12 THE WITNESS: I do. 13 COURT REPORTER: Counsel may begin. 14 15 EXAMINATION 16 BY MR. CHRISTOPHER: 17 Q. Good morning. 18 A. Good morning. 19 Q. State your name for the record. 20 A. Marwan Hassoun. 21 Q. Is there any reason why you cannot give 22 complete, truthful and accurate testimony today? 23 A. No. 24 Q. Great. Based on your CV I understand you've 25 been deposed before; is that correct?</p>
<p style="text-align: right;">Page 6</p> <p>1 DEPOSITION REMOTELY TAKEN VIA ZOOM CONFERENCE 2 WEDNESDAY, SEPTEMBER 11, 2024 3 9:34 A.M. (EST) to 5:28 P.M. (EST) 4 5 COURT REPORTER: Okay. We are now on the 6 record. Today's date is Wednesday, September 11, 2024, 7 and the time is 9:34 a.m. (EST). 8 This is the remote deposition of Dr. Marwan 9 Hassoun via Zoom videoconference being taken in the 10 matter of Qualcomm vs. Network System Technologies 11 IPR2024-00343, U.S. Patent No. 7,594,052. 12 The witness is appearing remotely from 13 Minneapolis, Minnesota. 14 It is imperative that everyone speak slowly, 15 clearly, and one at a time. Overlapping speakers are 16 not discernible over Zoom and cannot be reported. 17 My name is Linda Marquette, appearing for 18 Aptus Court Reporting, located at 401 West A Street, 19 Suite 1680, San Diego, California. 20 Will counsel please identify yourselves and 21 anyone with you, and state whom you represent, starting 22 with the taking attorney. 23 MR. CHRISTOPHER: Good morning. This is 24 Angelo Christopher with Nixon Peabody on behalf of 25 patent owner Network System Technologies.</p>	<p style="text-align: right;">Page 8</p> <p>1 A. That is correct. 2 Q. Approximately how many times have you been 3 deposed? 4 A. I'm not sure but in the neighborhood of 14, 5 15. 6 Q. All right. So you're probably familiar with 7 the ground rules, but, just as a reminder, your counsel 8 may object from time to time today, but unless he 9 instructs you not to answer, I don't think we're going 10 to get into that territory, you should answer the 11 question. 12 Understood? 13 A. Yes. 14 Q. And if you don't ask me to clarify a question, 15 I'm going to assume that you understand the question and 16 you can answer it. 17 Is that fair? 18 A. Yes. 19 Q. Okay. And, for the record, where are you 20 physically located for today's deposition? 21 A. I am in Minneapolis, Minnesota. 22 Q. Are you at counsel's office for petitioner? 23 A. Yes, I am. 24 Q. Okay. Did you do anything to prepare for 25 today's deposition?</p>

<p style="text-align: right;">Page 9</p> <p>1 A. Yes, I did.</p> <p>2 Q. Okay. And what did you do to prepare for</p> <p>3 today's deposition?</p> <p>4 A. So I read the patent. I read my report. I</p> <p>5 looked at the Institution decision. I looked at</p> <p>6 Dr. Chemlar, hope I'm pronouncing that correctly,</p> <p>7 declaration. I looked at patent owner's response. I</p> <p>8 did look at the Radulescu2004 reference. I looked at</p> <p>9 the Weber reference. And then I also met with the --</p> <p>10 some attorneys.</p> <p>11 Q. Those attorneys were attorneys for petitioner</p> <p>12 Qualcomm, right?</p> <p>13 A. That is correct.</p> <p>14 Q. Okay.</p> <p>15 A. That's what I remember for now.</p> <p>16 Q. All right. So I think you just alluded to</p> <p>17 this, but in this case you're offering opinions in U.S.</p> <p>18 Patent No. 7,594,052, correct?</p> <p>19 A. Yes.</p> <p>20 Q. And okay with you if we refer to the patent as</p> <p>21 the '052 patent today?</p> <p>22 A. Yes.</p> <p>23 Q. So when you were initially retained to author</p> <p>24 your declaration you were retained by Qualcomm and</p> <p>25 Samsung, correct?</p>	<p style="text-align: right;">Page 11</p> <p>1 me so ...</p> <p>2 Q. All right. Well, let me know when you have</p> <p>3 Exhibit 1003 from the Zoom chat open.</p> <p>4 (Exhibit 1003 was previously marked</p> <p>5 for identification by the Certified</p> <p>6 Shorthand Reporter.)</p> <p>7 A. Okay. I have it. It's open.</p> <p>8 BY MR. CHRISTOPHER:</p> <p>9 Q. Do you recognize Exhibit 1003 as a copy of</p> <p>10 your declaration?</p> <p>11 A. Yes, it looks like it.</p> <p>12 Q. Okay. And if we scroll all the way down to</p> <p>13 page 171 of the PDF -- let me know when you're there.</p> <p>14 A. I'm there.</p> <p>15 Q. Is that your signature on page 171?</p> <p>16 A. It is.</p> <p>17 Q. Okay. And this is dated December 19th, 2023,</p> <p>18 right?</p> <p>19 A. Correct.</p> <p>20 Q. Okay. Did you write your declaration?</p> <p>21 A. Yes, I did.</p> <p>22 Q. Okay. How long did you spend preparing your</p> <p>23 declaration?</p> <p>24 A. I really don't remember. It's been -- it's</p> <p>25 been quite a few months since it was written.</p>
<p style="text-align: right;">Page 10</p> <p>1 A. Yes.</p> <p>2 Q. And you understand that Samsung has been</p> <p>3 terminated from this IPR proceeding, correct?</p> <p>4 A. That's what I have been told.</p> <p>5 Q. Okay. Just a little more background on the</p> <p>6 parties. Are you aware of the fact that the '052 patent</p> <p>7 has been asserted by patent owner against petitioner in</p> <p>8 district court litigation?</p> <p>9 A. Yes, I am.</p> <p>10 Q. And are you also aware that the '052 patent</p> <p>11 was asserted against Samsung in district court</p> <p>12 litigation which has now been terminated?</p> <p>13 A. I knew about the first part, not sure about</p> <p>14 the second part. That might have been mentioned to me.</p> <p>15 Q. Okay. One more. And are you also aware that</p> <p>16 the '052 patent was asserted against Texas Instruments</p> <p>17 in a district court case?</p> <p>18 A. Yes, I am.</p> <p>19 Q. Okay. I am going to put a copy of your</p> <p>20 declaration in the Zoom chat. If you have a copy that</p> <p>21 you'd like to refer to, I'm okay with that so long as</p> <p>22 it's a clean copy. No notes, anything like that. I'll</p> <p>23 leave it -- I'll leave it up to you which version you</p> <p>24 want to look at.</p> <p>25 A. I'm going to use the ones that you upload for</p>	<p style="text-align: right;">Page 12</p> <p>1 Q. Can you estimate approximately how many hours</p> <p>2 you spent preparing the declaration?</p> <p>3 A. I really can't. It's hard. Because we -- I</p> <p>4 did this one and there was another patent that we're</p> <p>5 working on at the same time. So I'm not sure. It would</p> <p>6 be very difficult for me to do.</p> <p>7 Q. I'm just trying to get a ballpark. Did you</p> <p>8 spend more than eight hours on the declaration?</p> <p>9 A. Definitely, yes.</p> <p>10 Q. More than 20 hours?</p> <p>11 A. Definitely, yes.</p> <p>12 Q. More than 40 hours?</p> <p>13 A. Probably, yes.</p> <p>14 Q. Okay. Fair enough. In the course of</p> <p>15 preparing your declaration did you meet with anyone to</p> <p>16 discuss the content of the declaration?</p> <p>17 A. Yes. With attorneys.</p> <p>18 Q. Were those attorneys for petitioner Qualcomm?</p> <p>19 A. Yes.</p> <p>20 Q. Did you also meet with any attorneys for</p> <p>21 former petitioner Samsung?</p> <p>22 A. Yes.</p> <p>23 Q. Did you meet with anyone other than the</p> <p>24 attorneys for Qualcomm and Samsung?</p> <p>25 A. For this petition, no.</p>

<p style="text-align: right;">Page 13</p> <p>1 Q. You can turn to paragraph 27 of the</p> <p>2 declaration. Let me know when you're there. It's page</p> <p>3 [audio interruption].</p> <p>4 A. I'm on page 27.</p> <p>5 Q. Paragraph 27 which is page --</p> <p>6 A. Oh, paragraph 27. I lost my scroll bar here.</p> <p>7 Okay. I'm there.</p> <p>8 Q. All right. In paragraph 27 you listed the</p> <p>9 materials considered in forming your opinions, correct?</p> <p>10 A. Yes.</p> <p>11 Q. Okay. Is this a complete list of the</p> <p>12 materials you considered in forming the opinions in your</p> <p>13 declaration?</p> <p>14 A. To the best of my knowledge, yes.</p> <p>15 Q. Okay. On page 8, about two-thirds of the way</p> <p>16 down, there's a bullet point that starts with</p> <p>17 "Defendant's Joint Opening Claim Construction Brief."</p> <p>18 Do you see that?</p> <p>19 A. PDF page 8?</p> <p>20 Q. Correct. Sorry. Actually, it's -- internal</p> <p>21 page 8, PDF page 11.</p> <p>22 A. Yes, I'm on page 11.</p> <p>23 Q. Okay. And do you see about two-thirds of the</p> <p>24 way down there's a bullet point that starts with</p> <p>25 "Defendant's Joint Opening Claim Construction Brief"?</p>	<p style="text-align: right;">Page 15</p> <p>1 A. I have not listed any more here, no.</p> <p>2 Q. And do you recall if you reviewed any claim</p> <p>3 construction briefing from the Texas Instruments case?</p> <p>4 A. I don't recall. That's why I was saying if</p> <p>5 you would like me to go to my construction claim</p> <p>6 section, I might be able to answer that question better.</p> <p>7 Q. If the Texas Instrument claim construction</p> <p>8 isn't listed in your materials considered, would it be</p> <p>9 fair to say that you didn't consider it in preparing</p> <p>10 your declaration?</p> <p>11 A. Not necessarily. If I referenced it in my</p> <p>12 report, then I clearly did consider it. So that's why I</p> <p>13 wanted to go look.</p> <p>14 Q. Well, would it be fair to say that unless a</p> <p>15 document is listed in the materials considered or is</p> <p>16 otherwise cited in your declaration, you didn't consider</p> <p>17 it in preparing your declaration?</p> <p>18 A. That's probably true, yes.</p> <p>19 MR. CHRISTOPHER: I'm going to introduce</p> <p>20 Exhibit 1001 into the Zoom chat. Let me know when you</p> <p>21 have that open.</p> <p>22 (Exhibit 1001 was previously marked</p> <p>23 for identification by the Certified</p> <p>24 Shorthand Reporter.)</p> <p>25 ///</p>
<p style="text-align: right;">Page 14</p> <p>1 A. Yes.</p> <p>2 Q. Okay. That was Qualcomm's claim construction</p> <p>3 brief for the district court litigation, right?</p> <p>4 A. Yes.</p> <p>5 Q. And then the next bullet point, Network System</p> <p>6 Technologies, LLC's Response and its joint opening claim</p> <p>7 construction brief. Do you see that?</p> <p>8 A. Yes.</p> <p>9 Q. So that's NST's claim construction brief for</p> <p>10 the district court case, right?</p> <p>11 A. Yes.</p> <p>12 Q. And you considered both of these claim</p> <p>13 construction briefs when you prepared your declaration,</p> <p>14 right?</p> <p>15 A. Yes.</p> <p>16 Q. Did you review or consider any other claim</p> <p>17 construction briefing from the district court litigation</p> <p>18 involving petitioner patent owner?</p> <p>19 MR. VANDENBURGH: Objection, form.</p> <p>20 A. I don't remember. Can I look through my claim</p> <p>21 construction section?</p> <p>22 BY MR. CHRISTOPHER:</p> <p>23 Q. Well, you haven't listed any other claim</p> <p>24 construction briefs in the materials considered,</p> <p>25 correct?</p>	<p style="text-align: right;">Page 16</p> <p>1 BY MR. CHRISTOPHER:</p> <p>2 Q. Okay?</p> <p>3 A. Okay. I have it.</p> <p>4 Q. All right. Exhibit 1001 is a copy of the</p> <p>5 '052 patent, right?</p> <p>6 A. Yes.</p> <p>7 Q. You reviewed the '052 patent in its entirety</p> <p>8 when you prepared your declaration, right?</p> <p>9 A. Yes.</p> <p>10 Q. You reviewed the specification, right?</p> <p>11 A. Yes.</p> <p>12 Q. You reviewed the drawings, correct?</p> <p>13 A. Yes.</p> <p>14 Q. And you reviewed the claims, right?</p> <p>15 A. Yes.</p> <p>16 Q. And you had no issues understanding the</p> <p>17 '052 patent, correct?</p> <p>18 A. I'm not sure what that question entails but I</p> <p>19 understood what I read, yes.</p> <p>20 Q. I'm going to turn to the background section of</p> <p>21 the '052 patent in Column 1. In particular I will</p> <p>22 direct you to line 25. Let me know when you're -- when</p> <p>23 you're there.</p> <p>24 A. Okay. I'm there.</p> <p>25 Q. Line 25, the background reads:</p>

<p style="text-align: right;">Page 17</p> <p>1 "In conventional processing 2 systems the systems modules usually 3 communicate to each other via a 4 bus." 5 Do you see that? 6 A. I do. 7 Q. What is a bus? 8 A. A bus in the context of '052 is a collection 9 of one or more wires that -- that carry data. 10 Q. So in a system on a chip with a bus there are 11 one or more wires that carry data between two modules, 12 correct? 13 A. That could be considered a bus. You'll have 14 to show me more details for me to tell you. 15 Q. Okay. In the following sentence which starts 16 on line 27, the patent reads: 17 "As the number of modules 18 increases however, this way of 19 communication is no longer practical 20 for the following reasons." 21 Do you see that? 22 A. Yes. 23 Q. And so here the '052 patent is saying that 24 buses are no longer practical, correct? 25 A. Well, it's saying a bus, to communicate as the</p>	<p style="text-align: right;">Page 19</p> <p>1 advantages [sic]. Networks on chip, 2 NoC, have received considerable 3 attention recently as a solution to 4 the interconnect problem in highly 5 complex chips." 6 Do you see that? 7 A. Yes. 8 Q. So the '052 patent is teaching that a network 9 on a chip overcomes the disadvantages associated with 10 buses, correct? 11 MR. VANDENBURGH: Objection, form. 12 A. It's an effective way to overcome the 13 disadvantages of a bus. 14 BY MR. CHRISTOPHER: 15 Q. When you say "it" you're referring to a 16 network on a chip, right? 17 A. Yes. 18 Q. Okay. I'm going to focus on the sentence 19 starting on line 42. It reads: 20 "Second, NoCs also decouple 21 computation from communication, 22 which is essential in managing the 23 design of billion-transistor chips." 24 Do you see that? 25 A. Yes.</p>
<p style="text-align: right;">Page 18</p> <p>1 number of modules increases, is no longer practical. So 2 yes, that's what's said. 3 Q. And then in the following sentence it says: 4 "On the one hand the large number 5 of modules forms a too high bus 6 load." 7 Do you see that? 8 A. I do. 9 Q. And then following sentence which is on line 10 30: 11 "On the other hand the bus forms 12 a communication bottleneck as it 13 enables only one device to send data 14 to the bus." 15 Do you see that? 16 A. I do. 17 Q. So the '052 patent is describing disadvantages 18 of using a bus, correct? 19 A. Yes, if using a single bus to communicate with 20 a number of modules. 21 Q. Okay. If you scroll down to line 33, the 22 specification reads: 23 [As read.] 24 "A communication network forms an 25 effective way to overcome these</p>	<p style="text-align: right;">Page 20</p> <p>1 Q. What does it mean to decouple computation from 2 communication? 3 A. So it's a general statement here, but what 4 it's talking about is, my understanding would be that 5 decoupling the computation, you can -- in particular NoC 6 architectures, you can reduce the load perhaps on the 7 processors or the modules connected to them from having 8 to deal with perhaps the communication part of the -- of 9 the processing. So the NoCs, that's one way -- or some 10 of the NoCs are able to do that but at various degrees. 11 Q. So the '052 patent is teaching that one 12 advantage to using a NoC compared to a bus is that you 13 can decouple computation in communication, right? 14 A. One advantage that you can -- you can do that, 15 that's correct. But again, it depends on the 16 architecture of the bus you're talking about and the 17 architecture of the NoC you're talking about. 18 Q. Well, can a bus decouple computation from 19 communication? 20 A. You're going to have to show me the bus and 21 I'll -- I'll -- I'll let you know but I don't see why 22 not generally. 23 Q. If you scroll down, sticking in Column 1 on 24 48. Sorry, line 50. The second sentence in that 25 paragraph reads:</p>

<p>1 "This is because, in contrast to 2 existing on-chip interconnects 3 (e.g., buses, switches or 4 point-to-point wires), where the 5 communicating modules are directly 6 connected, in a NoC the modules 7 communicate remotely via network 8 nodes." 9 Do you see that? 10 A. I do. 11 Q. The '052 patent is teaching that buses, 12 switches or point-to-point wires are directly connecting 13 modules, correct? 14 A. Well, it's -- it's limiting the buses, the 15 switches and the point-to-point wires it's talking about 16 to the ones that are directly connected that provide 17 direct connections. So reading the entire sentence 18 that's what it says. 19 Q. And then the same sentence is distinguishing 20 the buses, switches or point-to-point wires from a 21 network on a chip, right? 22 A. It is distinguishing the buses, switches or 23 point-to-point wires where the communicating modules are 24 directly connected from an NoC module that has network 25 nodes.</p>	<p>Page 21</p> <p>1 is a router or I believe a switch as well. I can -- I 2 can verify that as examples of a network node. But the 3 '052 does not limit what a network node is. So my 4 belief -- my understanding of the '052 is, as I answered 5 earlier, is a network node is a module in the network 6 that provides a hop. 7 Q. All right. Well, can we at least agree that 8 the only examples of network nodes described in the 9 '052 patent are a router and a switch? 10 A. Give me a second, please, to verify that. 11 That's not necessarily true. There's other 12 examples that the '052 does provide. 13 Q. What other examples of a network node are 14 described in the '052 patent? 15 A. For example, circuits that provide 16 multiplexing is another example of a network node. 17 Q. Does the '052 patent expressly say that a 18 circuit providing multiplexing is an example of a 19 network node? 20 A. If you look on Column -- for example, 21 Column 4, and if you go to line 47 or 48, it says: 22 "The network-on-chip may include 23 wires, bus, time-division 24 multiplexing, switches and/or 25 routers within a network."</p> <p>Page 23</p>
<p>Page 22</p> <p>1 Q. And the difference between those existing 2 interconnects, like buses, switches or point-to-point 3 wires in a network on a chip is that the network on a 4 chip communicates remotely via networks, right? 5 A. Correct. The fact that there's a network node 6 versus the buses, switches or point-to-point wires that 7 provide direct communication, the answer is yes. 8 Q. What is a "network node"? 9 A. So in light of the '052 patent, "network node" 10 is a module that provides a hop in a network. 11 Q. Can you give me an example of what a network 12 node would be? 13 A. So the '052 patent, for example, gives -- a 14 network node example would be a router would be an 15 example of a network node. 16 Q. Is a switch another example of a network node? 17 A. It is possible that a -- the '052 discusses a 18 switch as a network node. So -- so the answer is yes, I 19 believe the '052 does mention a switch as a network 20 node. 21 Q. So aside from a switch or a router, can you 22 think of any other examples of a network node? 23 A. Well, again, you asked me what examples -- 24 what -- let me back up. 25 What I answered you is examples that '052 gave</p>	<p>Page 24</p> <p>1 Q. But it doesn't say that time-division 2 multiplexing is a network node, correct? 3 A. It doesn't say those words, no. 4 Q. And time division multiplexing, that's a 5 functionality, correct? 6 A. It is a functionality. One of ordinary skill 7 in the art would understand that that functionality -- 8 (Court reporter clarification.) 9 A. Would require components. 10 BY MR. CHRISTOPHER: 11 Q. All right. Let's go to Column 1. Excuse me, 12 Column 2. New column. Line 31. The new paragraph. 13 A. Okay. I'm there. 14 Q. All right. The first sentence of that 15 paragraph reads: 16 "Introducing networks as on-chip 17 interconnects radically changes the 18 communication when compared to 19 direct interconnects, such as buses 20 or switches." 21 Do you see that? 22 A. Yes. 23 Q. And so the one -- the '052 patent, again, is 24 distinguishing a network on a chip architecture from 25 buses or switches, correct?</p>

<p>Page 25</p> <p>1 A. Well, you have to read it in context of the</p> <p>2 '052 in this whole paragraph. In Column 1 the part --</p> <p>3 the section we're talking about it is explaining to you</p> <p>4 what it's distinguishing from. It's the buses,</p> <p>5 switches, or point-to-point wires where the</p> <p>6 communicating modules are directly connected. So that's</p> <p>7 what it's talking about.</p> <p>8 So, again, it's talking about the on-chip</p> <p>9 interconnects that distinguish from the direct</p> <p>10 interconnects. So even in that paragraph -- or that</p> <p>11 sentence that you read that we're talking about, it's</p> <p>12 one compared to direct interconnect, such as buses or</p> <p>13 switches. So it would have to be the buses and switches</p> <p>14 that provide a direct interconnect.</p> <p>15 Q. So to put a finer point on it, it's</p> <p>16 distinguishing a network on a chip from direct</p> <p>17 interconnects, correct?</p> <p>18 A. Correct.</p> <p>19 Q. And, in fact, it describes the distinction as</p> <p>20 a radical change, right?</p> <p>21 A. It says radical change, yes.</p> <p>22 Q. Second sentence of that paragraph which starts</p> <p>23 at line 33, it says:</p> <p>24 "This is because of the multihop</p> <p>25 nature of a network, where</p>	<p>Page 27</p> <p>1 nodes, right?</p> <p>2 A. Correct.</p> <p>3 Q. And so the packets can travel from one network</p> <p>4 node to a second network node, right?</p> <p>5 A. Correct.</p> <p>6 Q. So is the hop -- let me say it this way.</p> <p>7 Strike that.</p> <p>8 When a packet travels from a first network</p> <p>9 node to a second network node is that a hop?</p> <p>10 A. If I understand your example correctly, what</p> <p>11 you described is a direct connection between one network</p> <p>12 node to another network node.</p> <p>13 Q. So that wouldn't be a hop?</p> <p>14 A. If it's going directly from one node to</p> <p>15 another node, then it's not a hop. That's -- that's the</p> <p>16 distinction.</p> <p>17 Q. Okay. So if the network had a router and the</p> <p>18 packet traveled from a first network node to the router</p> <p>19 and then from the router to a second network node, is</p> <p>20 that a hop?</p> <p>21 A. Yes, the router would be a hop.</p> <p>22 Q. So the router itself is the hop or is it the</p> <p>23 communication traveling between the first node through</p> <p>24 the router to the second node the hop?</p> <p>25 A. The network node that you used in your</p>
<p>Page 26</p> <p>1 communication modules are not</p> <p>2 directly connected but separated by</p> <p>3 one or more network nodes."</p> <p>4 Do you see that?</p> <p>5 A. I do.</p> <p>6 Q. You used the term "hop" earlier. What is a</p> <p>7 "hop"?</p> <p>8 A. So again, in the context of the '052 patent</p> <p>9 they're explaining in this paragraph that a network node</p> <p>10 in a network, so not a direct connection, would result</p> <p>11 in a hop. So the existence of a network node would</p> <p>12 result in a hop.</p> <p>13 Q. So is a hop the communication path between two</p> <p>14 network nodes?</p> <p>15 A. One more time, sorry?</p> <p>16 Q. I'm just trying to understand what the hop is.</p> <p>17 Would the communication pathway between two network</p> <p>18 nodes and a network be considered a hop?</p> <p>19 A. I don't know what you mean by a "communication</p> <p>20 pathway." Can you give me an example?</p> <p>21 Q. Sure.</p> <p>22 A network on a chip, packets are transmitted</p> <p>23 over the network, right?</p> <p>24 A. Yes.</p> <p>25 Q. And the network can include multiple network</p>	<p>Page 28</p> <p>1 example, which is the router, provides the hop.</p> <p>2 Q. So the '052 patent describes the network in a</p> <p>3 network on a chip as, quote, multihop, right?</p> <p>4 A. Yes. It's because of the multihop nature of a</p> <p>5 network.</p> <p>6 Q. And by virtue of the word "multi," that</p> <p>7 requires more than one hop, correct?</p> <p>8 A. It does. My understanding of it is one or</p> <p>9 more.</p> <p>10 Q. Sorry, I just want to be clear on that.</p> <p>11 Does a multihop network require more than one</p> <p>12 hop?</p> <p>13 A. Well, my understanding would be that multihop</p> <p>14 would be more than one, yes.</p> <p>15 Q. Have you ever heard the term "multistage</p> <p>16 network"?</p> <p>17 A. I'm sure I have.</p> <p>18 Q. Is it -- is a multistage network synonymous</p> <p>19 with a multihop network?</p> <p>20 A. I -- I don't know. I would have to</p> <p>21 remember -- or figure out what the definition of a</p> <p>22 "multistage network" is. You would have to show me an</p> <p>23 example or a document to define it.</p> <p>24 Q. Go to Column 1, line 59.</p> <p>25 A. Did you say Column 159?</p>

<p style="text-align: right;">Page 29</p> <p>1 Q. Column 1, line 59.</p> <p>2 A. Okay. Okay. I'm there.</p> <p>3 Q. All right. The first sentence there at</p> <p>4 line 59 reads:</p> <p>5 [As read.]</p> <p>6 "Most of these topics have</p> <p>7 already been the subject of research</p> <p>8 in the field of local and wide area</p> <p>9 networks (computer networks) and as</p> <p>10 an interconnect for parallel machine</p> <p>11 interconnect networks."</p> <p>12 Do you see that?</p> <p>13 A. I do.</p> <p>14 Q. And you quoted this sentence from the</p> <p>15 background of the '052 patent in your declaration,</p> <p>16 correct?</p> <p>17 A. I don't remember, but if you say so, then</p> <p>18 sure. I have no problem with that paragraph -- with</p> <p>19 that sentence.</p> <p>20 Q. Okay. I want to skip a couple of sentences</p> <p>21 down starting at line 63 -- sorry, 64, it says:</p> <p>22 "However, NoC's premises are</p> <p>23 different from off-chip networks,</p> <p>24 and, therefore, most of the network</p> <p>25 design choices must be reevaluated."</p>	<p style="text-align: right;">Page 31</p> <p>1 A. I believe that's correct.</p> <p>2 Q. And the box on the far right-hand side with</p> <p>3 the S, that is a slave module, correct?</p> <p>4 A. Yes.</p> <p>5 Q. And the slave module can be implemented as a</p> <p>6 memory, right?</p> <p>7 A. Yes.</p> <p>8 Q. So, going back to the left-hand side, there</p> <p>9 are two rectangles with the letter A in them.</p> <p>10 Do you see those?</p> <p>11 A. I do.</p> <p>12 Q. Those are adapter units, correct?</p> <p>13 A. I believe that's correct.</p> <p>14 Q. And then to the right we have "NI."</p> <p>15 Do you see that?</p> <p>16 A. I do.</p> <p>17 Q. That is a network interface, correct?</p> <p>18 A. Yes.</p> <p>19 Q. And then we kind of have this irregular</p> <p>20 oval-shaped object in the middle with the letter N.</p> <p>21 Do you see that?</p> <p>22 A. Yes.</p> <p>23 Q. And that is a network, right?</p> <p>24 A. Yes.</p> <p>25 Q. And in this example there are two routers</p>
<p style="text-align: right;">Page 30</p> <p>1 Do you see that?</p> <p>2 A. I do.</p> <p>3 Q. You didn't quote that sentence from the</p> <p>4 background in your declaration, correct?</p> <p>5 A. I don't remember. I would have to go look.</p> <p>6 Q. Would it be fair to say that if you didn't</p> <p>7 quote this portion of the background, you don't have any</p> <p>8 opinions on it?</p> <p>9 A. No.</p> <p>10 Q. So you might have an opinion on this portion</p> <p>11 of the background even though you didn't discuss it in</p> <p>12 your declaration?</p> <p>13 A. Yes.</p> <p>14 Q. Let's go to Figure 1 of the '052 patent.</p> <p>15 A. I'm there.</p> <p>16 Q. All right. I kind of want to go over Figure 1</p> <p>17 to facilitate our discussion, in particular, what each</p> <p>18 of these blocks represent. So starting with the</p> <p>19 left-hand side there are two squares with an M.</p> <p>20 Do you see those?</p> <p>21 A. Yes.</p> <p>22 Q. Those are master processing modules, right?</p> <p>23 A. Those are masters, yes.</p> <p>24 Q. And the specification teaches that the masters</p> <p>25 can be implemented as a CPU, right?</p>	<p style="text-align: right;">Page 32</p> <p>1 inside the network, right?</p> <p>2 A. There's -- it includes two routers, yes.</p> <p>3 Q. Okay. And then at the bottom of the figure do</p> <p>4 you see there's kind of a bracket and it says "msg"?</p> <p>5 A. Yes.</p> <p>6 Q. And that's going between the adapter unit and</p> <p>7 the network interface, correct?</p> <p>8 A. Yes.</p> <p>9 Q. So a message is transmitted from the adapter</p> <p>10 unit to the network interface, correct?</p> <p>11 A. It's communicated both ways.</p> <p>12 Q. And then do you see where it says "flt" below</p> <p>13 the bracket below the network N?</p> <p>14 A. I see, yes, flt.</p> <p>15 Q. "FLT" refers to flit, correct?</p> <p>16 A. I'm not sure what it refers to here. But ...</p> <p>17 Q. Are you familiar with the term "flit"?</p> <p>18 A. I am.</p> <p>19 Q. A "flit" is a packet that is transmitted over</p> <p>20 the network, right?</p> <p>21 MR. VANDENBURGH: Objection, form.</p> <p>22 A. I would have to look beyond the '052 patent</p> <p>23 but the '052 patent wasn't particularly -- used the word</p> <p>24 flit. I don't know what flt -- if it explained what flt</p> <p>25 is in this figure.</p>

<p style="text-align: right;">Page 33</p> <p>1 BY MR. CHRISTOPHER:</p> <p>2 Q. Would a person of skill in the art understand</p> <p>3 that packets transmitted over a network are sometimes</p> <p>4 called flits?</p> <p>5 A. Yes.</p> <p>6 Q. Turn to Figure 2A, please. Let me know when</p> <p>7 you're there.</p> <p>8 A. Okay. I'm there.</p> <p>9 Q. All right. Figure 2A. This is showing the</p> <p>10 adapter unit we discussed earlier in Figure 1, correct?</p> <p>11 A. It's -- it's an embodiment of an adapter unit,</p> <p>12 yes.</p> <p>13 Q. Sure. And the SEQ box, that is a</p> <p>14 sequentializer, correct?</p> <p>15 A. That's how it's described, that's correct.</p> <p>16 Q. And bottom box, DESEQ, that's a</p> <p>17 desequentializer, right?</p> <p>18 A. Yes. That's how it's described.</p> <p>19 Q. The specification refers to the adapter unit</p> <p>20 as a shell, correct?</p> <p>21 A. Yes, it does.</p> <p>22 Q. As a person of skill in the art do you have an</p> <p>23 understanding as to what "shell" refers to?</p> <p>24 A. Well, it depends on the context, so it's -- at</p> <p>25 least in the context of the '052 patent, the shell is --</p>	<p style="text-align: right;">Page 35</p> <p>1 Q. I just realized I misspoke. Let me ask that</p> <p>2 again.</p> <p>3 The second arrow to the left of the</p> <p>4 sequentializer unit where it says "cmd plus flags," what</p> <p>5 does that represent?</p> <p>6 A. So "cmd" represents a command plus their</p> <p>7 flags.</p> <p>8 Q. What are flags?</p> <p>9 A. Flags are whatever you want to -- whatever an</p> <p>10 architect defines them to be. So any information or</p> <p>11 attribute that are a part of the command or are relevant</p> <p>12 to the command.</p> <p>13 Q. Okay. All right. And then the third arrow on</p> <p>14 left of the sequentializer unit, that refers to an</p> <p>15 address, correct?</p> <p>16 A. I'm sorry. You faded there for a second. Can</p> <p>17 you repeat that?</p> <p>18 Q. Sure.</p> <p>19 The third arrow, the bottom arrow on the left</p> <p>20 of the sequentializer unit of Figure 2A, that is an</p> <p>21 address, correct?</p> <p>22 A. Correct.</p> <p>23 Q. All right. So bottom half of the same page,</p> <p>24 Figure 3. Let me know when you're there.</p> <p>25 A. Just clarification, looking at the -- I'm</p>
<p style="text-align: right;">Page 34</p> <p>1 is -- is an adapter. So an adapter or a shell is used</p> <p>2 synonymously.</p> <p>3 Q. So in Figure 2A there are three arrows to the</p> <p>4 left of the sequentializer. Do you see those?</p> <p>5 A. Yes.</p> <p>6 (Court reporter clarification.)</p> <p>7 MR. CHRISTOPHER: Let me reask the question.</p> <p>8 BY MR. CHRISTOPHER:</p> <p>9 Q. In Figure 2A there are three arrows to the</p> <p>10 left of the sequentializer. Do you see those?</p> <p>11 A. Yes.</p> <p>12 Q. Those arrows are representing information</p> <p>13 received from the master processing object, correct?</p> <p>14 A. Figure 2A is master adapter. Let me just</p> <p>15 confirm that. Yes.</p> <p>16 Q. All right. So those three arrows are the</p> <p>17 input for the sequentializer and the output is the msg,</p> <p>18 correct?</p> <p>19 A. Yes.</p> <p>20 Q. Okay. What does wr_data on that top arrow</p> <p>21 represent?</p> <p>22 A. Sorry. It's write data.</p> <p>23 Q. What about the second arrow, smd [sic] plus</p> <p>24 flags, what does that represent?</p> <p>25 A. I'm sorry. Did you say smd or cmd?</p>	<p style="text-align: right;">Page 36</p> <p>1 looking at the specification and it refers to at addr</p> <p>2 [sic] as addresses.</p> <p>3 Q. Where are you at in the specification?</p> <p>4 A. So if you go to Column 6 on 50 it says</p> <p>5 "addresses adr."</p> <p>6 Q. All right. Let's go back to Figure 3. Let me</p> <p>7 know when you're there.</p> <p>8 A. I'm there.</p> <p>9 Q. Okay. Figure 3, the box labeled DTL-A, that</p> <p>10 is an example of the adapter unit from Figure 2A,</p> <p>11 correct?</p> <p>12 A. Yes.</p> <p>13 Q. Likewise, the box underneath it, AXI-A, that's</p> <p>14 another example of the adapter unit in Figure 2A, right?</p> <p>15 A. That is correct.</p> <p>16 Q. And Figure 3 is teaching that the adapter unit</p> <p>17 can be implemented in the network interface, correct?</p> <p>18 A. Correct.</p> <p>19 Q. Go to the next page, Figure 4. Let me know</p> <p>20 when you're there.</p> <p>21 A. I am.</p> <p>22 Q. All right. So in Figure 4 the same naming</p> <p>23 conventions as Figure 1 apply. M refers to master. N</p> <p>24 refers to network. NI refers to network interface. And</p> <p>25 S refers to slave. Right?</p>

<p style="text-align: right;">Page 37</p> <p>1 A. Yes.</p> <p>2 Q. Okay. And in this figure, S1, next to it it</p> <p>3 says "0000-7FFF." Do you see that?</p> <p>4 A. Yes.</p> <p>5 Q. That is an address range, correct?</p> <p>6 A. Correct.</p> <p>7 Q. What do the four characters on the left-hand</p> <p>8 side of the dash represent?</p> <p>9 A. An address.</p> <p>10 Q. And then the four characters to the right, is</p> <p>11 that a second address?</p> <p>12 A. Correct.</p> <p>13 Q. And so the range would be all of the addresses</p> <p>14 between the address on the left-hand side of the dash</p> <p>15 and the address on the right-hand side of the dash; is</p> <p>16 that right?</p> <p>17 A. Yes.</p> <p>18 Q. Okay. How many characters, letters and</p> <p>19 numbers, are required to express an address in the</p> <p>20 context of a network on a chip?</p> <p>21 A. Well, it depends on what format you're</p> <p>22 expressing it in. You can express it in decimal,</p> <p>23 hexadecimal, all the way down to the chip level, which</p> <p>24 is binary, so I'm not sure what you mean by "how many</p> <p>25 characters."</p>	<p style="text-align: right;">Page 39</p> <p>1 Q. So an electrical engineer would meet the</p> <p>2 definition for a person of skill in the art and someone</p> <p>3 like a computer science or computer engineering degree</p> <p>4 could meet the definition depending on the coursework;</p> <p>5 is that right?</p> <p>6 MR. VANDENBURGH: Objection, compound.</p> <p>7 A. Yes. Electrical engineering or any of the</p> <p>8 other related fields plus the experience, as I mention</p> <p>9 in the paragraph.</p> <p>10 BY MR. CHRISTOPHER:</p> <p>11 Q. But with respect to computer engineering or</p> <p>12 computer science they might meet the definition of a</p> <p>13 person of skill in the art, they might not in terms of</p> <p>14 just the education component of it?</p> <p>15 A. I don't -- I don't think that's an accurate</p> <p>16 representation. They are all related fields. And then</p> <p>17 the three years of experience on top of it would --</p> <p>18 would -- for example, a master's degree in any of these</p> <p>19 related fields plus the experience in SoC design. So</p> <p>20 I'm not -- I'm not limiting the field of study.</p> <p>21 Q. So if someone had a computer engineering or</p> <p>22 computer science degree and the requisite work</p> <p>23 experience, your view is that they would be a person of</p> <p>24 skill in the art --</p> <p>25 A. Yes.</p>
<p style="text-align: right;">Page 38</p> <p>1 Q. What format is this address range in Figure 3</p> <p>2 expressing?</p> <p>3 A. This looks like hexadecimal.</p> <p>4 Q. All right. If we turn back to your</p> <p>5 declaration, Exhibit 1003. I'll direct you to</p> <p>6 paragraph 32.</p> <p>7 A. Okay.</p> <p>8 Q. In paragraph 32 you're offering your opinion</p> <p>9 on the relevant person of skill in the art for the</p> <p>10 '052 patent, right?</p> <p>11 A. Yes.</p> <p>12 Q. And in terms of education, you identify a</p> <p>13 master's degree in electrical engineering or a related</p> <p>14 field, three years of work experience or a bachelor's in</p> <p>15 electrical engineering or related field with five years</p> <p>16 of work experience, right?</p> <p>17 A. Yes.</p> <p>18 Q. In terms of the education, what would you</p> <p>19 consider to be a related field?</p> <p>20 A. Well, it depends on what school you go to and</p> <p>21 what degree you're get- -- what they're teaching that</p> <p>22 degree, the electrical engineering, computer</p> <p>23 engineering, computer science, sometimes physics</p> <p>24 degrees. So it depends on what school you're talking</p> <p>25 about. That's why I said "or related fields."</p>	<p style="text-align: right;">Page 40</p> <p>1 Q. -- is that right?</p> <p>2 A. Yes, that's what I'm saying.</p> <p>3 Q. Okay. And the relevant work experience here</p> <p>4 is in the field of SoC design, right?</p> <p>5 A. Yes.</p> <p>6 Q. Can you describe the general process for</p> <p>7 designing a system on a chip?</p> <p>8 A. There's a -- it's a -- it's a -- it's a big,</p> <p>9 wide open question. But designing a system-on-chip, you</p> <p>10 have specifications, architecture, system design. You</p> <p>11 have RTL design, synthesis. You have layout. You have</p> <p>12 verifications, simulation. There are many aspects of</p> <p>13 the SoC design, you know, there's many steps in an SoC</p> <p>14 design process.</p> <p>15 Q. Would a person of skill in the art under your</p> <p>16 definition have experience in each of those design</p> <p>17 process steps?</p> <p>18 A. Yes, they would be exposed to all of that.</p> <p>19 Q. Is one of the steps in SoC design writing</p> <p>20 source code?</p> <p>21 A. Not necessarily. You might be writing the</p> <p>22 source code. You might be verifying the source code.</p> <p>23 When you talk about source code, SoC design is -- I'm</p> <p>24 referring to source code like RTL or Verilog, so a</p> <p>25 hardware description language type thing. But there are</p>

<p style="text-align: right;">Page 41</p> <p>1 also SoC engineers that I've worked with where their 2 specialty -- you know, the part they are working on is 3 perhaps some of the custom design components in there so 4 they don't necessarily have to write source code.</p> <p>5 Q. When you refer to custom design components is 6 that hardware?</p> <p>7 A. Yes.</p> <p>8 Q. So would a person of skill in the art under 9 your definition have experience writing or reviewing 10 source code for designing SoCs?</p> <p>11 A. Just repeat the question, please.</p> <p>12 Q. Sure. 13 Would a person of skill in the art with three 14 years of work experience in the field of SoC design, do 15 they need to have experience either writing or reviewing 16 source code?</p> <p>17 A. They don't necessarily have to review, you 18 know, write or review the source code but be able to 19 understand and review the simulation results from a 20 module that's been designed. Because in all likelihood 21 they are going to have to interface to it.</p> <p>22 Q. So just trying to understand the process in 23 general. So one step is to write source code and then 24 you referred to simulation. So does the design process 25 entail running a simulation on the source code?</p>	<p style="text-align: right;">Page 43</p> <p>1 through synthesis but you're going to collect the pieces 2 of the code and you decide at some level what -- at what 3 level you're going to do the synthesis. So you put -- 4 you know, for RTL you're going to put it through 5 something like a synopsis tool, you know, one of the 6 cadence tools, but you put it through synthesis in order 7 to turn it into physical gates.</p> <p>8 And then what happens is those physical gates 9 using an automatic place and route tool, sometimes 10 custom place and route, you place it and route it and 11 you put it on the -- you know, that's how it turns into 12 a layout. And from the layout you have a set of -- you 13 send it to manufacturing where you manufacture a set of 14 masks. And then those masks are used in the 15 manufacturing of the physical chip.</p> <p>16 Q. All right. Going back to paragraph 32 of your 17 declaration, second sentence that spans page 13 onto 14, 18 you wrote:</p> <p>19 "This POSA would have had an 20 understanding of SoC interconnects, 21 as well as the concepts of 22 large-scale networks." 23 Do you see that?</p> <p>24 A. Yes.</p> <p>25 Q. Does large-scale networks refer to off-chip</p>
<p style="text-align: right;">Page 42</p> <p>1 A. One of the steps is running simulations to 2 verify the functionality of the module you've designed 3 using source code.</p> <p>4 Q. And once you've run the simulations and you've 5 verified the functionality of the source code, how do 6 you take the next step to actually build a physical 7 system on a chip?</p> <p>8 A. I mean, there's hundreds of modules that we're 9 talking about here that have to be integrated, so as I 10 was explaining earlier, you have a system-level 11 architecture. And you have a high-level representation 12 of the chip and you keep going down that hierarchy level 13 until you get to that module. If you're talking about 14 one module that's written using RTL, that model -- that 15 module is verified at that level and then those modules 16 are integrated together and then verified at the next 17 level and you have a hierarchical set of verification 18 steps all the way up to the chip levels. So there's an 19 entire verification plan that goes with SoC design.</p> <p>20 Q. Okay. I just want to get at -- close the loop 21 on the discussion with the code. How do you get from 22 source code to a physical chip? Do you compile the 23 source code?</p> <p>24 A. Well, you have the RTL, for example, the 25 hardware RTL. And then what you do is you put it</p>	<p style="text-align: right;">Page 44</p> <p>1 networks?</p> <p>2 A. In this concept -- in this context I'm talking 3 about on-chip -- on-chip networks, so SoCs and the 4 on-chip networks.</p> <p>5 Q. So a person of skill in the art would have an 6 understanding of the concepts of networks on a chip; is 7 that right?</p> <p>8 A. Yes.</p> <p>9 Q. What do you mean by large, in large scale?</p> <p>10 A. So when you're talking about, again, an SoC, a 11 system-on-chip, by definition you've created -- you've 12 integrated many systems on a single chip, so you've put 13 a lot of modules on one chip. That's the reason it's 14 called a system-on-chip versus just a chip. That was 15 the evolution, is the additional functionality that you 16 put on a chip. And as such, these chips have -- these 17 modules, sorry, have to communicate with each other. 18 And what I'm saying is, that's what a large -- an SoC 19 will have a large scale network in it.</p> <p>20 Q. So "large" refers to the number of modules 21 that are on the chip, right?</p> <p>22 A. That's fair.</p> <p>23 Q. In the time -- the relevant frame for this 24 patent, 2004, what would you consider to be a large 25 scale system on a chip? How many modules?</p>

<p style="text-align: right;">Page 45</p> <p>1 A. I -- I -- I couldn't say. It depends on what 2 level you're defining a module.</p> <p>3 Q. How many different ways can you define 4 "module"?</p> <p>5 A. Which level of hierarchy are you on? For 6 example, take a CPU, one could call that a module. If 7 you look inside of a CPU, there's hundreds of modules 8 that are inside of a CPU. And then you can go even 9 layers below that. So it depends what you're -- what 10 level of hierarchy you're talking about.</p> <p>11 Q. Well, let's use Figure 1 of the '052 patent as 12 an example. So you have master processing module and 13 you have a slave module that's a memory. In that 14 context, what would you consider to be a large scale 15 network in 2004?</p> <p>16 A. It's -- it's -- large scale network is 17 irrelevant to Figure 1 of the '052 patent. The 18 '052 patent is giving you an example of two masters, one 19 slave and embodiment and they have a routing network, 20 you know, a network in the middle. They're showing you 21 a single network interface. But that could be part of a 22 bigger, you know, a bigger SoC. So the claims don't 23 claim an SoC. The claims simply claim an integrated -- 24 well, an integrated circuit. So, I don't see the 25 relevance whether this is a large scale network or a</p>	<p style="text-align: right;">Page 47</p> <p>1 11:02 a.m.</p> <p>2 BY MR. CHRISTOPHER:</p> <p>3 Q. Dr. Hassoun, did you discuss your testimony 4 with anyone during our break?</p> <p>5 A. No.</p> <p>6 Q. Okay. I want to turn to paragraph 83 of your 7 declaration -- excuse me, 82.</p> <p>8 A. I'm there.</p> <p>9 Q. All right. In paragraph 82 you are discussing 10 claim construction for the term "interconnect means," 11 correct?</p> <p>12 A. Correct.</p> <p>13 Q. And "interconnect means," that appears in 14 independent Claims 1, 6 and 7 of the '052 patent, 15 correct?</p> <p>16 A. That is correct.</p> <p>17 Q. All right. In the first sentence of 18 paragraph 82 you stated: 19 "I understand that the term 20 'interconnect means' is presumed 21 under the law to be a 22 'means-plus-function' limitation." 23 Do you see that?</p> <p>24 A. Yes.</p> <p>25 Q. So for purposes of your declaration, you've</p>
<p style="text-align: right;">Page 46</p> <p>1 large scale SoC. It could be part of a large scale SoC 2 or -- or not. That's -- that's not what's being claimed 3 here.</p> <p>4 Q. Yeah, I'm not asking if Figure 1 is a large 5 scale network. I was referring to Figure 1 is an 6 example for the hierarchy level. In terms of the number 7 of processing modules and memories, what would be 8 considered a large scale network?</p> <p>9 A. I -- I don't -- I don't have a number for you. 10 I don't. And you haven't shown me a physical chip that 11 I'm happy to comment on whether it's large scale or not. 12 But the picture you're looking at here, one of ordinary 13 skill in the art can look at the module M and that could 14 be -- have hundreds of modules in it. And the patent is 15 silent on -- it's agnostic to that, what's inside of the 16 master.</p> <p>17 MR. VANDENBURGH: Angelo, can we find a time 18 to take a break here?</p> <p>19 MR. CHRISTOPHER: This is a great spot for a 20 break.</p> <p>21 Let's go off the record.</p> <p>22 COURT REPORTER: Off the record at 10:48 a.m. 23 (Recess was taken from 10:48 a.m. 24 to 11:02 a.m.) 25 COURT REPORTER: Back on the record at</p>	<p style="text-align: right;">Page 48</p> <p>1 assumed that the term "interconnect means" is a 2 means-plus-function term, correct?</p> <p>3 A. I have done that and I also rendered opinion 4 on NST's construction as well.</p> <p>5 Q. Okay. Just to be clear, so you have assumed 6 that the term "interconnect means" is 7 means-plus-function. You are not offering an opinion 8 that it is a means-plus-function term, correct?</p> <p>9 MR. VANDENBURGH: Objection. Asked and 10 answered.</p> <p>11 A. That is correct.</p> <p>12 BY MR. CHRISTOPHER:</p> <p>13 Q. Okay. Is it your understanding that the 14 presumption regarding whether interconnect means is a 15 means-plus-function term can be rebutted?</p> <p>16 A. I don't understand the question, sorry.</p> <p>17 Q. So in your declaration you state you 18 understand -- you stated your understanding that 19 interconnect means is presumed under the law to be a 20 means-plus-function term, right?</p> <p>21 A. Yes.</p> <p>22 Q. And are you aware that that presumption can be 23 rebutted?</p> <p>24 A. That's the part I'm asking for clarification. 25 Can be rebutted, what does that mean?</p>

<p style="text-align: right;">Page 49</p> <p>1 Q. Are you aware of the fact that evidence can be 2 presented rebutting the presumption that interconnect 3 means is a means-plus-function term? 4 A. I still don't understand the question. I'm 5 not sure how that changes my opinion here. I don't -- I 6 don't understand the question. 7 Are you asking me a legal proceedings 8 question? Which if you are, I can't answer that. I 9 don't have that -- 10 Q. Yeah. I'm trying to understand if you -- if 11 you have an understanding as to whether or not the 12 presumption under the law you discuss in your 13 declaration can be rebutted? 14 A. I don't know one way or the other. There's 15 legal proceedings that I get my instructions from the 16 attorneys and I follow those instructions. 17 Q. Okay. Let's go to Claim 6 of the '052 patent, 18 which is in Column 10. 19 A. Column 10, correct? 20 Q. Yes. Line 20, do you see "interconnect means 21 (N)"? 22 A. I do. 23 Q. The "N" following the term "interconnect 24 means" refers to the network described in the 25 specification, correct?</p>	<p style="text-align: right;">Page 51</p> <p>1 of a plurality of interconnected 2 network routers R." 3 Do you see that? 4 A. I do. 5 Q. A network router is a physical structure, 6 correct? 7 A. Yes. 8 Q. Let's go back to paragraph 82 of your 9 declaration. 10 A. I'm there. 11 Q. All right. And this spans the last sentence 12 on page 33 onto the top of page 34. You state here that 13 the corresponding structure for the interconnect means 14 is a bus, switch, point-to-point wire or network, 15 correct? 16 A. I'm sorry. I didn't follow where -- where you 17 are. Page 33 of the PDF? 18 Q. Correct. 19 A. Okay. And you're pointing to -- what's the 20 beginning of the sentence? 21 Q. I'm pointing to the sentence that spans 22 page 33 onto the top of page 34 where you identify a 23 bus, switch, point-to-point wire or network as the 24 corresponding structure for the interconnect means. 25 Do you see that?</p>
<p style="text-align: right;">Page 50</p> <p>1 A. "N" in this specification refers to network, 2 yes. 3 Q. And the letter N in the claim is referring to 4 the network in the specification, correct? 5 A. Yes. 6 Q. Okay. If you'd turn to Column 4, I'll direct 7 you to line 46. Let me know when you're there. 8 A. I see it. I am there. 9 Q. Okay. Line 46 reads: 10 "The interconnect is embodied as 11 a network-on-chip, NoC, allowing 12 communication between all 13 aforementioned modules." 14 Do you see that? 15 A. Yes. 16 Q. So here the specification is teaching that the 17 interconnect in the '052 patent is embodied as a network 18 on a chip, correct? 19 A. Yes. 20 Q. And let's turn now to Column 5, line 24. Let 21 me know when you're there. 22 A. I see it. 23 Q. All right. At line 24 the specification 24 reads: 25 "The network N may be comprised</p>	<p style="text-align: right;">Page 52</p> <p>1 A. Yes. 2 Q. And so your opinion is that a single bus 3 corresponds to the claimed interconnect means; is that 4 right? 5 A. The structure, yes. 6 Q. And your opinion is that a single switch 7 corresponds to the claimed network means -- excuse me. 8 Strike that. 9 Let's try that again. 10 Your opinion is that a single switch 11 corresponds to the claimed interconnect means, correct? 12 A. The structure of the interconnect means, yes. 13 Q. Same with point-to-point wire, your opinion is 14 that a single point-to-point wire can correspond to the 15 claimed interconnect means, correct? 16 A. Yes, the structure of the interconnect means. 17 Q. If you would scroll down now to paragraph 83 18 of your declaration. 19 A. I'm there. 20 Q. Okay. In paragraph 83 you quote: Patent 21 owners claimed construction for the term "interconnect 22 means" from the district court litigation, correct? 23 A. Yes. 24 Q. And then in the second sentence of that 25 paragraph you say: I disagree with that construction.</p>

<p style="text-align: right;">Page 53</p> <p>1 Do you see that?</p> <p>2 A. Yes.</p> <p>3 Q. Why do you disagree with that construction?</p> <p>4 A. Well, two -- two reasons. One, I have been</p> <p>5 told this is a means-plus-function term, so that term on</p> <p>6 its own -- that definition is not a means-plus-function.</p> <p>7 And the second one is it's a somewhat limiting</p> <p>8 definition of a network.</p> <p>9 Q. In what way is this a limiting definition of a</p> <p>10 network?</p> <p>11 A. Well, it eliminates, for example, a bus, a</p> <p>12 switch or a point-to-point wire. It eliminates that.</p> <p>13 Q. Earlier when we discussed the background of</p> <p>14 the specification we talked about how the specification</p> <p>15 distinguishes a network on a chip from a bus.</p> <p>16 Do you recall that?</p> <p>17 A. I do.</p> <p>18 Q. And the specification teaches that a bus is an</p> <p>19 example of an existing interconnect that the patent is</p> <p>20 trying to improve upon, correct?</p> <p>21 A. A single bus, yes.</p> <p>22 Q. And your view is that the term "interconnect</p> <p>23 means" in the claims of the '052 patent reads on the</p> <p>24 very prior art that the '052 patent is trying to improve</p> <p>25 upon; is that right?</p>	<p style="text-align: right;">Page 55</p> <p>1 A. Yes.</p> <p>2 Q. Or rather, to be more specific, one of those</p> <p>3 protocols would be used by the master module in a system</p> <p>4 on a chip, correct?</p> <p>5 A. Sure. One or more. You could have an</p> <p>6 architecture where you have a master that has two</p> <p>7 different interfaces.</p> <p>8 Q. And if we go back to Figure 1.</p> <p>9 A. Okay.</p> <p>10 Q. Rather, actually, let's go to Figure 3. Are</p> <p>11 you there?</p> <p>12 A. Yes. I'm sorry, yes, I am.</p> <p>13 Q. Figure 3. We talked earlier about the DTL-A</p> <p>14 being an adapter unit. Do you recall that?</p> <p>15 A. Yes.</p> <p>16 Q. Okay. That adapter unit receives information</p> <p>17 in this example in the DTL protocol from the master</p> <p>18 module, right?</p> <p>19 A. Correct.</p> <p>20 Q. And the adapter unit then converts the DTL</p> <p>21 protocol information into a message, right?</p> <p>22 A. Correct.</p> <p>23 Q. And then that message is converted into a</p> <p>24 packet, correct?</p> <p>25 A. Correct.</p>
<p style="text-align: right;">Page 54</p> <p>1 A. It's a structure of a network. Yes, that's --</p> <p>2 my understanding of the disclosure of the '052 patent is</p> <p>3 that interconnect means in the claim doesn't limit it to</p> <p>4 the multihop interconnect.</p> <p>5 While the multihop interconnect is definitely</p> <p>6 a network, there's no question about it, or is</p> <p>7 interconnect means. I'm not disagreeing that a multihop</p> <p>8 interconnection between modules separated by one or more</p> <p>9 network nodes is not an interconnect. But I'm saying</p> <p>10 that the -- it's excluding other structures that also</p> <p>11 could be a network, could be interconnect means, so ...</p> <p>12 Q. Let's go back to the '052 patent. Turn to</p> <p>13 Column 4, line 15. Let me know when you're there.</p> <p>14 A. I'm there.</p> <p>15 Q. All right. At line 15 it reads:</p> <p>16 "The invention is based on the</p> <p>17 idea to offer differentiated</p> <p>18 services for protocols such as DTL,</p> <p>19 MTL, AXI and OCP by mapping the</p> <p>20 identification means of these</p> <p>21 protocols to connections."</p> <p>22 Do you see that?</p> <p>23 A. I do.</p> <p>24 Q. So the protocols DTL, MTL, AXI and OCP are</p> <p>25 used by the master module, correct?</p>	<p style="text-align: right;">Page 56</p> <p>1 Q. And that packet is sent over the network,</p> <p>2 correct?</p> <p>3 A. Correct.</p> <p>4 Q. And the reason the '052 patent performs that</p> <p>5 conversion in the adapter unit and network interface is</p> <p>6 because information in the DTL protocol cannot be sent</p> <p>7 over the network, correct?</p> <p>8 MR. VANDENBURGH: Objection, form.</p> <p>9 A. Well, it depends on what protocol you're --</p> <p>10 you're using in the network itself. So in the network</p> <p>11 itself I don't recall if DTL is a connection or</p> <p>12 connection bus standard but the '052 is silent on really</p> <p>13 what the format of the message is or what the protocol</p> <p>14 that's used in the -- in the NoC itself. So one of</p> <p>15 ordinary skill in the art would understand that you can</p> <p>16 use appropriate protocols on the NoC itself.</p> <p>17 So in the embodiment that we're talking about</p> <p>18 that -- in Figure 3, that is correct. DTL is being --</p> <p>19 because of the existence of the adapter, it must be</p> <p>20 being translated to whatever the message format needs to</p> <p>21 be for the network interface than to translate it into</p> <p>22 the appropriate packets to go over the network.</p> <p>23 BY MR. CHRISTOPHER:</p> <p>24 Q. If you'd go back to Column 8.</p> <p>25 A. Okay. I'm there.</p>

<p style="text-align: right;">Page 57</p> <p>1 Q. All right. Line 54. Specifications says: 2 [As read.] 3 "Backward compatibility of 4 on-chip networks is achieved by 5 means of the adaptor units/shells to 6 enable existing protocols, such as 7 DTL, AXI and OCP, to use 8 differential services as offered by 9 a connection-based interconnect such 10 as an on-chip network." 11 Do you see that? 12 A. Yes. 13 Q. So the '052 patent is teaching that by using 14 the adapter units you can provide backwards 15 compatibility for protocols like DTL, AXI and OCP such 16 that information can be transmitted through the network, 17 correct? 18 A. Correct. 19 Q. With the idea being without that conversion by 20 the adapter unit you could not communicate between the 21 master and slave module through the network using DTL, 22 AXI or OCP, right? 23 A. That's not necessarily true. The adapter 24 units are optional in the '052, so it depends on what 25 signaling the network interface kernel, for example, is</p>	<p style="text-align: right;">Page 59</p> <p>1 BY MR. CHRISTOPHER: 2 Q. The master module used OCP and the slave 3 module also used OCP. In order for those two modules to 4 communicate over the network you would need an adapter 5 unit to translate OCP into packets that go over the 6 network, correct? 7 A. No. You would not need the adapter to do 8 that. 9 Q. How would you do that without an adapter? 10 A. So if the NI kernel is packetizing the -- the 11 messages that are going over the NoC, so in your example 12 you gave me an OCP on one end, OCP on another end. If 13 the messaging that the NI kernel understands is also 14 OCP, accepts OCP messages, then you wouldn't need the 15 adapter so you wouldn't need to translate. 16 And what happens is the NI kernel will 17 packetize that information, send it out. It gets to the 18 other side, and again, if the other side is still OCP, 19 then you've got yourself -- you don't need the adapter. 20 You don't need that translation. So that's an example 21 of -- that '052 contemplates because it doesn't require 22 an adapter. 23 Q. The NI kernel is not expressly required in the 24 claims, right? 25 A. It is not.</p>
<p style="text-align: right;">Page 58</p> <p>1 using. So you don't necessarily need an adapter there. 2 So -- or you can -- you can use a simple adapter in that 3 process. So it depends on what the protocol or the 4 signaling that's being used within the NoC going into 5 the network interface current. 6 Q. Regardless of whether the adapter unit is 7 required, would you agree that the type of translation 8 described in the '052 patent is required to allow the 9 master module using one of those protocols to 10 communicate with the slave over the multihop network? 11 MR. VANDENBURGH: Objection, form. 12 A. It's not -- the translate -- the adapter unit 13 translation is not required if the message is sent by 14 the master in a form that is -- the NI kernel can take 15 and packetize and go into the network. So that's why 16 the adapter is not required and the '052 patent doesn't 17 tell you what protocol is being used within the network. 18 It's generally explaining that you need to -- whatever 19 it is that's coming in needs to be a message. 20 And then it doesn't tell you what the protocol 21 inside of the NoC is or the protocol of the message 22 going into the NI kernel so the adapter is not required. 23 Let me rephrase that. The adapter might or 24 might not be required. 25 ///</p>	<p style="text-align: right;">Page 60</p> <p>1 Q. Okay. Similar example, if the master module 2 uses OCP and the slave module uses DTL, you would need 3 the adapter unit described in the '052 patent for those 4 modules to communicate over the multihop network, 5 correct? 6 A. Depends on what the interface -- the signaling 7 is but you would definitely need -- you would definitely 8 need at least one adapter. You would need one 9 translator. 10 Q. Would you agree that in the field of systems 11 on a chip a multihop network and a bus are different 12 types of interconnects? 13 MR. VANDENBURGH: Can I have that question 14 read back, please. 15 (Last question read as follows: 16 COURT REPORTER: "Would you agree 17 that in the field of systems on a 18 chip a multihop network and a bus are 19 different types of interconnects?") 20 MR. VANDENBURGH: Objection, form. 21 A. So you'll have to show me the bus we're 22 talking about, but if it's a direct bus, then the answer 23 is yes. 24 BY MR. CHRISTOPHER: 25 Q. Let's turn to paragraph 84 of your</p>

<p style="text-align: right;">Page 61</p> <p>1 declaration, which is on page 35 of the PDF.</p> <p>2 A. Yes, I'm there.</p> <p>3 Q. All right. In paragraph 84 you are offering</p> <p>4 your opinion on claim construction for the term "mapping</p> <p>5 means," correct?</p> <p>6 A. Yes.</p> <p>7 Q. And the term "mapping means" appears in</p> <p>8 independent Claims 1 and 7 of the '052 patent, correct?</p> <p>9 A. Correct.</p> <p>10 Q. And you state:</p> <p>11 "I understand that the term</p> <p>12 'mapping means' is presumed under</p> <p>13 the law to be a</p> <p>14 'means-plus-function' claim."</p> <p>15 Do you see that?</p> <p>16 A. Yes.</p> <p>17 Q. Like the interconnect means, you have assumed</p> <p>18 for purposes of your declaration that the term "mapping</p> <p>19 means" is a means-plus-function term, correct?</p> <p>20 A. Correct.</p> <p>21 Q. And you understand that when you construe a</p> <p>22 means-plus-function term one of the steps is that you</p> <p>23 need to identify the corresponding structure disclosed</p> <p>24 in the specification, correct?</p> <p>25 A. Correct.</p>	<p style="text-align: right;">Page 63</p> <p>1 the '052 patent, how would they do it?</p> <p>2 A. It depends on what the data coming in looks</p> <p>3 like and the data going out looks like. So if the</p> <p>4 messages are coming in a certain way, you can</p> <p>5 sequentialize them in order to send one message out at a</p> <p>6 time. For example, you can sequentialize the different</p> <p>7 pieces of data coming in and then put them out one after</p> <p>8 the other. So you can build it using FIFOs, you can</p> <p>9 build it using buffers. But that's usually -- that's</p> <p>10 one way of building a sequentializer.</p> <p>11 Q. What about the desequentializer, any</p> <p>12 difference in terms of how a person of skill in the art</p> <p>13 would go about actually implementing that?</p> <p>14 A. Again, a person of ordinary skill in the art</p> <p>15 would know how to do it but you do -- again, it's --</p> <p>16 using buffers and FIFOs you can do that.</p> <p>17 Q. Let's go back to your declaration,</p> <p>18 paragraph -- same paragraph --</p> <p>19 A. Okay.</p> <p>20 Q. -- actually. Paragraph 84.</p> <p>21 Okay. In paragraph 84 you identify the</p> <p>22 function of the mapping means as:</p> <p>23 "... mapping the requested at</p> <p>24 least one communication service</p> <p>25 based on said specific communication</p>
<p style="text-align: right;">Page 62</p> <p>1 Q. What is the corresponding structure in the</p> <p>2 specification for the claimed mapping means?</p> <p>3 A. If you look at paragraph 85, it's the adapter</p> <p>4 unit.</p> <p>5 Q. So a person of ordinary skill in the art would</p> <p>6 understand that the adapter unit disclosed in the</p> <p>7 specification is the corresponding structure for the</p> <p>8 claimed mapping means, correct?</p> <p>9 A. Yes.</p> <p>10 Q. If we go back to Figure 2A of the '052 patent.</p> <p>11 A. Okay.</p> <p>12 Q. The adapter unit -- we discussed this</p> <p>13 earlier -- includes a sequentializer and a</p> <p>14 desequentializer, correct?</p> <p>15 A. An embodiment of it, yes.</p> <p>16 Q. In your construction of mapping means are the</p> <p>17 sequentializer and desequentializer required?</p> <p>18 A. Yes, that's the structure.</p> <p>19 Q. So to practice the claimed mapping means you</p> <p>20 would need a sequentializer and a desequentializer; is</p> <p>21 that right?</p> <p>22 A. Yes, you would. That is part of the</p> <p>23 structure.</p> <p>24 Q. Okay. If a person of ordinary skill in the</p> <p>25 art were asked to build the sequentializer described in</p>	<p style="text-align: right;">Page 64</p> <p>1 properties to a connection based on</p> <p>2 a set of connection properties</p> <p>3 according to said at least one</p> <p>4 communication service</p> <p>5 identification."</p> <p>6 Right?</p> <p>7 A. Yes.</p> <p>8 Q. I want to focus on the first word, "mapping."</p> <p>9 Mapping also appears in independent Claim 6 of the</p> <p>10 '052 patent, correct?</p> <p>11 A. Yes.</p> <p>12 Q. What does "mapping" mean in the context of the</p> <p>13 '052 patent?</p> <p>14 A. So mapping, as the claim explained, is you</p> <p>15 have a communication service, okay, that is based on</p> <p>16 specific communication properties. You're going to map</p> <p>17 those requests to a set of connection properties, to a</p> <p>18 connection that is based on a set of connection</p> <p>19 properties according to the one communication service --</p> <p>20 to a communication service identification. So it's</p> <p>21 exactly what the claim says. So you're taking the</p> <p>22 request. You're mapping it onto connections based on</p> <p>23 the properties and identification.</p> <p>24 Q. What does it mean to map a request onto a</p> <p>25 connection?</p>

<p style="text-align: right;">Page 65</p> <p>1 A. That means that you're going to send that 2 request, whatever that request is asking for on that 3 particular connection, given these particular 4 conditions.</p> <p>5 Q. So mapping requires selecting a particular 6 connection for the request, correct?</p> <p>7 A. Based on the specific communication properties 8 and at least one communication service identification, 9 yes.</p> <p>10 Q. So an example -- in an example of a multihop 11 network there can be multiple connections existing at 12 the same time, correct?</p> <p>13 A. Yes.</p> <p>14 Q. And the idea of mapping the '052 patent 15 entails selecting a particular connection based on 16 certain criteria associated with the request, correct?</p> <p>17 A. Based on particular criteria that the property 18 has -- the connection has and a communication service 19 identification. So based on that you select that 20 connection, yes.</p> <p>21 Q. So mapping requires more than just associating 22 a request to a connection, it requires associating the 23 request with a specific connection based on the 24 communication service identification, correct?</p> <p>25 A. It's associating that request with a</p>	<p style="text-align: right;">Page 67</p> <p>1 might or might not need the adapter unit. But the 2 statement as written is -- I have no reason to -- I 3 don't disagree with because it uses AHB, DTL and MTL and 4 it's referring to Figure 1.</p> <p>5 Q. Earlier we talked about an example where the 6 master module uses a protocol and the second module, the 7 slave module, uses a second protocol.</p> <p>8 Do you recall that?</p> <p>9 A. Yes.</p> <p>10 Q. In such an embodiment you would need to 11 perform that conversion described in the specification 12 in order to perform the mapping step in the claims, 13 correct?</p> <p>14 A. I've answered that question, yes, you need to 15 do it at least on one end.</p> <p>16 Q. Okay. All right. If you can turn now to 17 independent Claim 6 of the '052 patent. Let me know 18 when you're there. It's on the last page of the PDF.</p> <p>19 A. I'm there.</p> <p>20 Q. All right. Do you see at the beginning of 21 Claim 6 it reads:</p> <p>22 "Method of communication service 23 mapping in an integrated circuit 24 ..."</p> <p>25 Do you see that?</p>
<p style="text-align: right;">Page 66</p> <p>1 connection that has communication service -- that has 2 communication properties, specific communication 3 properties.</p> <p>4 Q. And that association is according to the 5 communication service identification, correct?</p> <p>6 A. Yes. There's an identification required, yes.</p> <p>7 Q. Go to Column 6 on 61 of the '052 patent. Let 8 me know when you're there.</p> <p>9 A. Sorry, I'm there.</p> <p>10 Q. So at line 61 at Column 6 it reads:</p> <p>11 "The network interface NI 12 provides a conversion of the 13 packet-based communication of the 14 network N to the higher-level 15 protocol, AHB, DTL, MTL, that the IP 16 modules of Fig. 1 use." 17 Do you see that?</p> <p>18 A. Yes.</p> <p>19 Q. Would a person of ordinary skill in the art 20 understand that this conversion is necessary to perform 21 the claimed mapping?</p> <p>22 A. You -- the conversion from the packet-based 23 communication of the network N to those, that that needs 24 to happen in the network interface. But then depending 25 on what protocol is being used in the IP modules, you</p>	<p style="text-align: right;">Page 68</p> <p>1 A. Yes.</p> <p>2 Q. And all the way down at line 18 it says:</p> <p>3 "... comprising the steps of ..."</p> <p>4 Do you see that?</p> <p>5 A. Yes.</p> <p>6 Q. Do you understand that that portion of the 7 claim is referred to as the preamble?</p> <p>8 A. Yes.</p> <p>9 Q. Do you agree that the preamble of Claim 6 is 10 limiting?</p> <p>11 A. Yes.</p> <p>12 Q. Then starting at line 19 there's a series of 13 steps in Claim 6. There's a coupling step, there's an 14 enabling step, there's a controlling step and there's a 15 mapping step.</p> <p>16 Do you see those?</p> <p>17 A. Yes.</p> <p>18 Q. Would a person of ordinary skill in the art 19 understand that the coupling, enabling, controlling and 20 mapping steps in Claim 6 need to be performed in the 21 order in which they are written?</p> <p>22 A. At least -- at least a couple of them have to 23 be. For example, you need to enable a connection-based 24 communication having a set of communication properties, 25 you need to enable that. So you need to find it in</p>

<p style="text-align: right;">Page 69</p> <p>1 order for you to do, for example, the last step which is</p> <p>2 mapping the requested at least one communication</p> <p>3 service. So in order to do that based on the</p> <p>4 communication -- based at least on one communication</p> <p>5 service -- sorry.</p> <p>6 Based on set of specific communication</p> <p>7 properties, then you need to have enabled the connection</p> <p>8 based on communication -- a connection-based</p> <p>9 communication having a set of connection properties. So</p> <p>10 you at least need to do that step before you do the</p> <p>11 mapping. So there is some order in the steps that have</p> <p>12 to happen.</p> <p>13 Q. Are there any other steps that need to be</p> <p>14 performed in order in Claim 6?</p> <p>15 A. Well, you do need to do the coupling and the</p> <p>16 controlling. But, for example, the enabling and the</p> <p>17 controlling, I'd have to look into it more, those don't</p> <p>18 necessarily have to be in that order.</p> <p>19 Q. So the coupling, enabling and controlling</p> <p>20 steps all need to occur before the mapping step; is that</p> <p>21 right?</p> <p>22 A. Yes. You have to have it coupled. You have</p> <p>23 to enable that connection. You have to -- give me a</p> <p>24 second to read the third -- the third one. Well, no,</p> <p>25 the third one doesn't necessarily have to happen before</p>	<p style="text-align: right;">Page 71</p> <p>1 A. Yes.</p> <p>2 Q. Got it. I want to talk about the term</p> <p>3 "connection" in Claim 6. The connection is a network</p> <p>4 connection, correct?</p> <p>5 A. It's -- it's a connection in -- through the</p> <p>6 interconnect means so that's -- that's what a connection</p> <p>7 is in the claim.</p> <p>8 Q. Would you agree that a connection is</p> <p>9 considered a set of channels?</p> <p>10 A. To the -- I mean, a connection could be one or</p> <p>11 more channels.</p> <p>12 Q. So the connection claimed in the '052 patent</p> <p>13 is in the network -- strike that.</p> <p>14 The connection in the claims of the</p> <p>15 '052 patent include at least one channel, correct?</p> <p>16 A. Let me see what I said about that.</p> <p>17 So, I'm sorry, ask me the question again.</p> <p>18 Q. The term "connection" in the claims of the</p> <p>19 '052 patent includes at least one channel, correct?</p> <p>20 A. Yes.</p> <p>21 MR. CHRISTOPHER: Let's go off the record.</p> <p>22 COURT REPORTER: Off the record at 12:00 p.m.</p> <p>23 (Recess was taken from 12:00 p.m.</p> <p>24 to 12:14 p.m.)</p> <p>25 COURT REPORTER: Back on the record at</p>
<p style="text-align: right;">Page 70</p> <p>1 the mapping. The third one is the controlling of the</p> <p>2 communication, so it doesn't necessarily have to happen</p> <p>3 before the mapping.</p> <p>4 Q. So at least the coupling and the enabling</p> <p>5 steps have to happen before mapping, correct?</p> <p>6 A. Yes.</p> <p>7 Q. Does the coupling step need to occur prior to</p> <p>8 the enabling step?</p> <p>9 A. Oh, yes. If -- if they are not coupled, then</p> <p>10 there's no connection. You will not be able to enable a</p> <p>11 connection if you're not coupled, so yes.</p> <p>12 Q. So let's put this together. Coupling must</p> <p>13 occur before enabling. Coupling and enabling must occur</p> <p>14 before mapping. Correct?</p> <p>15 MR. VANDENBURGH: Objection, compound.</p> <p>16 A. So yes, they have -- the coupling and</p> <p>17 enabling -- so coupling needs to happen before enabling</p> <p>18 and enabling before mapping.</p> <p>19 BY MR. CHRISTOPHER:</p> <p>20 Q. Do coupling and enabling need to occur before</p> <p>21 controlling?</p> <p>22 A. Yes, because -- let me look at that a second.</p> <p>23 No. It does not.</p> <p>24 Q. So the controlling step can occur at any point</p> <p>25 prior to or after the other steps?</p>	<p style="text-align: right;">Page 72</p> <p>1 12:14 p.m.</p> <p>2 BY MR. CHRISTOPHER:</p> <p>3 Q. Dr. Hassoun, did you discuss your testimony</p> <p>4 with anyone during our break?</p> <p>5 A. No.</p> <p>6 MR. CHRISTOPHER: All right. I've dropped in</p> <p>7 the Zoom chat a copy of Exhibit 1006.</p> <p>8 (Exhibit 1006 was previously marked</p> <p>9 for identification by the Certified</p> <p>10 Shorthand Reporter.)</p> <p>11 BY MR. CHRISTOPHER:</p> <p>12 Q. If you could please open that up and let me</p> <p>13 know when you have that available to you.</p> <p>14 A. I see it.</p> <p>15 Q. All right. Do you recognize this as the OCP</p> <p>16 reference discussed in your declaration?</p> <p>17 A. Yes.</p> <p>18 Q. And this is the 2001 version of the OCP</p> <p>19 specification, correct?</p> <p>20 A. Yes.</p> <p>21 Q. Are you aware of any subsequent versions of</p> <p>22 the OCP specification?</p> <p>23 A. I am not.</p> <p>24 Q. Sorry, was that a no?</p> <p>25 A. No.</p>

<p style="text-align: right;">Page 73</p> <p>1 Q. Okay. Let's turn back quickly to your 2 declaration, paragraph 108. So in paragraph 108 you 3 state: 4 [As read.] 5 "OCP provides a signaling 6 protocol for the communications that 7 includes the use of threads and 8 connection." 9 Do you see that? 10 A. Yes. 11 Q. And then in the next sentence you write: 12 "The signals used in requests 13 issued by system initiator (acting 14 as a master processing module) 15 include the MAddr, MAddrSpace, MCmd, 16 MthreadID, MconnID and Mdata 17 signals, as listed in the table 18 below." 19 Do you see that? 20 A. Yes. 21 Q. Is it your understanding that each of those 22 signals will be in every request issued using the OCP 23 protocol? 24 A. No. Some of these -- some of these signals 25 are optional. They don't have to be in every request.</p>	<p style="text-align: right;">Page 75</p> <p>1 "Table 1 lists the basic OCP 2 signals that must be present in any 3 OCP interface." 4 Do you see that? 5 A. I do. 6 Q. And within Table 1 we see MAddr, right? 7 A. Yes. 8 Q. So MAddr must be present in any OCP interface, 9 right? 10 A. Yes. 11 Q. And maybe to make this a little bit easier, 12 can we just refer to MAddr as the address signal? 13 A. Sure. Or M address, is that easier? 14 Q. M address, let's do that. 15 A. Yeah, that way I know it's OCP. 16 Q. And the M address space signal is not listed 17 here in Table 1, correct? 18 A. Correct. 19 Q. Okay. Likewise, the MThreadID signal is not 20 listed here in Table 1, correct? 21 A. Correct. 22 Q. Okay. Let's turn now to page 26 of the PDF. 23 Let me know when you're there. 24 A. Bottom left page 38, right? 25 Q. No. It's confusing. Page 26 of the PDF.</p>
<p style="text-align: right;">Page 74</p> <p>1 Q. All right. Which of those signals are 2 optional? 3 A. I will have to look them up to tell you which 4 ones are optional and which ones are required. 5 Do you want me to do that? 6 Q. Do you know if the MAddr signal is optional? 7 A. I would have to look it up. I don't remember. 8 Q. Well, let's start with this. What is the 9 MAddr signal? 10 A. So it's the transfer address and it specifies 11 the slave dependent address of the resource targeted by 12 the current transfer. 13 Q. Are you reading that from OCP? 14 A. I'm reading it from my report, paragraph 160. 15 Q. Okay. And what about the MAddrSpace signal, 16 what is that? 17 A. So the MAddrSpace signal is the address space. 18 It's used to indicate the address region of a transfer. 19 Q. Okay. Let's go back to Exhibit 1006, OCP, and 20 turn to page -- page 12 of the PDF, which is labeled in 21 the bottom left corner as page 24. Let me know when 22 you're there. 23 A. I'm there. 24 Q. So under the heading "Basic Signals," OCP 25 reads:</p>	<p style="text-align: right;">Page 76</p> <p>1 A. This is page 26, oh. 2 Q. No, it's -- okay. It's -- 3 A. Sorry. 4 Q. -- bottom left corner pagination page 26. 5 A. Oh. 6 Q. Which appears now to be page 14 of the PDF, if 7 that helps you. 8 A. I'm sorry, page what of the PDF? 9 Q. Twenty-six. Sorry, 14, which should have a 10 page 26 in the bottom left-hand corner. 11 A. Yes, I'm there. 12 Q. At the top it says "Simple Extensions." Do 13 you see that? 14 A. Yes. 15 Q. Says: 16 "Table 4 lists the simple OCP 17 extensions. The extensions add 18 address spaces, byte enables, burst 19 support, datahandshake and response 20 flow control." 21 Do you see that? 22 A. Yes. 23 Q. And so OCP is describing the M address space 24 signal as an extension, correct? 25 A. Correct.</p>

<p style="text-align: right;">Page 77</p> <p>1 Q. And it doesn't say here that the M address 2 space signal is required in every OCP request, correct? 3 A. Well, just -- just to be clear what that 4 means, that means a system that implements these 5 extensions would need to have that address signal -- 6 that M address space signal included. And the system 7 that doesn't use those extensions would not need to have 8 it. But the signal itself would be required if the 9 system is architected to use OCP with the extensions. 10 It's not like any request can randomly have it or not 11 have it. 12 Q. But you would agree that there can be OCP 13 requests that do not include the M address space signal, 14 right? 15 MR. VANDENBURGH: Objection. Asked and 16 answered. 17 A. Same answer. It depends on how you 18 architected the system. So if you've architected the 19 system that you're not going to use the extensions, then 20 you wouldn't need it. But if you've architected the 21 system that that's a requirement, then that would be a 22 requirement in that system. 23 BY MR. CHRISTOPHER: 24 Q. All right. Let's go to page 30 of the PDF -- 25 sorry, page 31 of the PDF which has page 43 in the</p>	<p style="text-align: right;">Page 79</p> <p>1 be present depending on the architecture, would you 2 agree with that? 3 A. Yes. 4 Q. Okay. Then let's go to page -- make sure I 5 get you the right number. This is page 42 [sic] of the 6 PDF which has an internal page number in the bottom left 7 corner of 54 [sic]. Let me know when you're there. 8 A. Okay. I'm there. 9 Q. All right. It says at the top: 10 "Figure 5 illustrates a simple 11 write and read transfer on a basic 12 OCP interface." 13 Do you see that? 14 A. Yes. 15 Q. And then in the Figure 5 we see a number of 16 signals labeled "Request Phase." Do you see that? 17 A. Yes. 18 Q. One of those signals is the M address signal, 19 right? 20 A. Correct. 21 Q. And we don't see M address space in Figure 5, 22 correct? 23 A. Correct. But let me -- let me put in context 24 what these figures are. If you look at the page before 25 it, it says:</p>
<p style="text-align: right;">Page 78</p> <p>1 bottom left corner with the header "Transfer Effects" at 2 the top. Let me know when you're there. 3 A. I see it. 4 Q. All right. In the paragraph at the top under 5 the header "Transfer Effects," the third sentence reads: 6 [As read.] 7 "The request acts on the location 8 address of the value passed over the 9 M address and the M address space 10 fields (if present) during the 11 request phase." 12 Do you see that? 13 A. Yes. 14 Q. And the phrase, "if present" following M 15 address space is implying that M address space may not 16 be present in the OCP request, correct? 17 A. So, again, my answer is, the way you're 18 phrasing it makes it sound like you can choose to have 19 it in or not. OCP is a guideline on how to implement 20 this particular protocol. And a system as architected 21 that uses M address space would require the use of 22 address -- M address space in the requests. So I just 23 want to make sure we're on the same page. 24 Q. By using the phrase "if present," the OCP 25 specification is confirming that M address space may not</p>	<p style="text-align: right;">Page 80</p> <p>1 "The timing diagrams within this 2 chapter look at signals as strategic 3 points and are not intended to 4 provide full explanations, but, 5 rather, highlight specific areas of 6 interest. The diagrams are provided 7 solely as examples." 8 And then it says, the next paragraph it says: 9 "Most fields are unspecified 10 whenever their corresponding phase 11 is not asserted." 12 So just to put it in context, what we're 13 looking at here, these are examples and they are not 14 meant to be comprehensive. So I just wanted to make 15 sure that's on the record. 16 Q. Okay. And MThreadID also is not expressly 17 listed in Figure 5, right? 18 A. In these examples that don't specify all of 19 the signals, yes. 20 Q. Okay. Page 72 of the PDF, which is in the 21 left-hand corner at the bottom page 84. Let me know 22 when you're there. 23 A. I'm there. 24 Q. All right. Do you see the heading "Features"? 25 A. Yes.</p>

<p style="text-align: right;">Page 81</p> <p>1 Q. Third paragraph down it reads:</p> <p>2 "When the M address space</p> <p>3 extension is present on the OCP,</p> <p>4 Q-Slave supports multiple address</p> <p>5 spaces in the memory area."</p> <p>6 Do you see that?</p> <p>7 A. Yes.</p> <p>8 Q. So, again, when it says when the M address</p> <p>9 space extension is present, that is suggesting that M</p> <p>10 address space may not be present on the OCP, depending</p> <p>11 upon the architecture, correct?</p> <p>12 A. If you architect the system such that your</p> <p>13 slaves support multiple address spaces, then you're</p> <p>14 going to need the M address space field. So it is</p> <p>15 dependent on the architecture of the system.</p> <p>16 Q. My question is, by virtue of saying when the M</p> <p>17 address space extension is present, this is expressly</p> <p>18 contemplating that the M address space extension may not</p> <p>19 be present depending upon the architecture, right?</p> <p>20 A. And again, I just want to make clear what</p> <p>21 "depending on the architecture" means is, if the system</p> <p>22 is architected in a certain way, then the M address</p> <p>23 space extension would be required.</p> <p>24 Q. That doesn't answer my question, which is,</p> <p>25 this is expressly contemplating that the M address space</p>	<p style="text-align: right;">Page 83</p> <p>1 address space extension is not used, then the answer is</p> <p>2 yes.</p> <p>3 BY MR. CHRISTOPHER:</p> <p>4 Q. Thank you.</p> <p>5 Let's go to page -- I'll ask you a more</p> <p>6 general question in OCP. Would you agree that the M</p> <p>7 address signal and the M address space signal are</p> <p>8 different signals within OCP?</p> <p>9 A. If you mean by different signals they have</p> <p>10 different fields in their requests, then the answer is</p> <p>11 yes.</p> <p>12 MR. CHRISTOPHER: Bear with me one minute.</p> <p>13 I'm going to introduce a new exhibit in the -- or</p> <p>14 rather, a premarked exhibit in the chat.</p> <p>15 (Exhibit 1005 was previously marked</p> <p>16 for identification by the Certified</p> <p>17 Shorthand Reporter.)</p> <p>18 BY MR. CHRISTOPHER:</p> <p>19 Q. All right. Exhibit 1005 should be in the</p> <p>20 chat. If you could open that up, let me know when you</p> <p>21 have it available, that would be great.</p> <p>22 A. I have it open.</p> <p>23 Q. Great. All right. Do you recognize this as</p> <p>24 the Radulescu reference you've opined on in your</p> <p>25 declaration?</p>
<p style="text-align: right;">Page 82</p> <p>1 extension may not be present in certain architectures,</p> <p>2 correct?</p> <p>3 A. And in certain systems they have to be</p> <p>4 present, is what I'm making clear. It depends on how</p> <p>5 the system is architected.</p> <p>6 Q. Again, that's not my question.</p> <p>7 There are certain architectures in which the M</p> <p>8 address space may not be present, correct?</p> <p>9 A. I'll refer you to my previous answer and my</p> <p>10 "yes" here refers to the previous answer.</p> <p>11 Q. So the answer to that question is yes?</p> <p>12 MR. VANDENBURGH: Objection. Asked and</p> <p>13 answered.</p> <p>14 A. Okay. I'll -- I'll repeat my answer. If the</p> <p>15 system is architected such that the Q-Slave supports</p> <p>16 multiple address spaces, then the M address space is</p> <p>17 required. To the extent that's what we mean by</p> <p>18 architecture in the question, then the answer is yes.</p> <p>19 BY MR. CHRISTOPHER:</p> <p>20 Q. I don't think that answers my question, which</p> <p>21 is, there are certain architectures in which there is no</p> <p>22 M address space extension, right?</p> <p>23 MR. VANDENBURGH: Asked and answered.</p> <p>24 Objection.</p> <p>25 A. If the system is architected such that M</p>	<p style="text-align: right;">Page 84</p> <p>1 A. Yes.</p> <p>2 Q. All right. Let's go to Figure 1 of</p> <p>3 Radulescu2004. It's on page 3 of the PDF. Let me know</p> <p>4 when you're there.</p> <p>5 A. I'm there.</p> <p>6 Q. So Figure 1 of Radulescu2004 is very similar</p> <p>7 to Figure 3 of the '052 patent, correct?</p> <p>8 A. Yes.</p> <p>9 Q. Okay. And we have two adapters, AXI adapter</p> <p>10 and DTL adapter, inside the network interface just like</p> <p>11 the '052 patent, right?</p> <p>12 A. Yes.</p> <p>13 Q. And there's also a block labeled "narrowcast"</p> <p>14 between the adapters and the NI kernel.</p> <p>15 Do you see that?</p> <p>16 A. Yes.</p> <p>17 Q. What is the narrowcast block in Figure 1 of</p> <p>18 Radulescu?</p> <p>19 A. So narrowcast connections are connections</p> <p>20 between one master and several slaves where each</p> <p>21 transaction is executed by a single slave selected based</p> <p>22 on the address provided in the transaction.</p> <p>23 Q. What is the narrowcast block within Figure 1</p> <p>24 of Radulescu representing?</p> <p>25 A. It is an example of a shell.</p>

<p style="text-align: right;">Page 85</p> <p>1 Q. And in this context what is a shell?</p> <p>2 A. So a shell is a form of an adapter. It's part</p> <p>3 of a network. Could be part of the network interface in</p> <p>4 order to interface between the incoming signals and the</p> <p>5 NI kernel's signals in order to perform the -- to enable</p> <p>6 the transaction to be executed by more than one slave or</p> <p>7 to send that transaction to the right slave.</p> <p>8 Q. Okay. If you can turn to the next page of</p> <p>9 Radulescu, take a look at Figure 3. Let me know when</p> <p>10 you're there.</p> <p>11 A. I am.</p> <p>12 Q. All right. Figure 3 is showing further</p> <p>13 details of the narrowcast block from Figure 1, correct?</p> <p>14 A. Yes.</p> <p>15 Q. And on the left-hand side in Figure 3 we see</p> <p>16 message_req [sic]. Do you see that?</p> <p>17 A. I'm sorry, in Figure 8?</p> <p>18 Q. Figure 3.</p> <p>19 A. Oh. Yes.</p> <p>20 Q. And that message is received by the narrowcast</p> <p>21 shell from the adapter unit, correct?</p> <p>22 A. Yes.</p> <p>23 Q. And then underneath that there is C-O-N-N-I-D.</p> <p>24 Do you see that?</p> <p>25 A. Yes.</p>	<p style="text-align: right;">Page 87</p> <p>1 What is the Resp box in Figure 3 of</p> <p>2 Radulescu2004, what would one in the skill of the art</p> <p>3 understand that to be?</p> <p>4 A. So one of ordinary skill would understand that</p> <p>5 to be related to the response, sending out a response</p> <p>6 message.</p> <p>7 Q. So in Figure 3 at the bottom there's an arrow</p> <p>8 pointing to the light -- to the left, msg_resp.</p> <p>9 Do you see that?</p> <p>10 A. On the bottom of Figure 3?</p> <p>11 Q. Correct.</p> <p>12 A. On the left?</p> <p>13 Q. There's an arrow going from right to left</p> <p>14 labeled "msg_resp," do you see that?</p> <p>15 A. Right. I do see it.</p> <p>16 Q. Okay. That is the response message that</p> <p>17 passes through the narrowcast shell, correct?</p> <p>18 A. That is the response message from the other</p> <p>19 side coming in that direction, yes.</p> <p>20 Q. And that is not in line with the Resp block at</p> <p>21 the top of Figure 3, right?</p> <p>22 A. No. The response block, the Resp block is</p> <p>23 sending an Resp request on the bottom on the cid_req.</p> <p>24 Q. What about the other item below the Conn and</p> <p>25 Resp blocks in Figure 3 also labeled "Resp"? It's kind</p>
<p style="text-align: right;">Page 86</p> <p>1 Q. Is that also received by the narrowcast shell</p> <p>2 from the adapter unit?</p> <p>3 A. It can be from that adapter unit or from --</p> <p>4 from the master.</p> <p>5 Q. Okay. And then to the right of connid there's</p> <p>6 a square that says "Conn" within the narrowcast shell.</p> <p>7 Do you see that?</p> <p>8 A. Yes.</p> <p>9 Q. What does the Conn block represent in</p> <p>10 Figure 3?</p> <p>11 A. So I believe that's the connection block but</p> <p>12 let me verify that. So it's called the Conn block,</p> <p>13 C-O-N-N block. And within a narrowcast connection a</p> <p>14 slave for which the transaction is destined is selected</p> <p>15 based on the address and then, in parentheses, Conn</p> <p>16 block.</p> <p>17 Q. Does that mean that the Conn block is doing</p> <p>18 the selection based on the address?</p> <p>19 A. That's what it's saying, yes.</p> <p>20 Q. And then back to Figure 3, to the right and</p> <p>21 slightly above the Conn block there's a block labeled</p> <p>22 R-E-S-P. Do you see that?</p> <p>23 A. Yes.</p> <p>24 Q. What is the R-S -- sorry. Let's try that</p> <p>25 again with the correct spelling.</p>	<p style="text-align: right;">Page 88</p> <p>1 of an elongated U with some horizontal lines through it.</p> <p>2 What would a person of skill in the art understand that</p> <p>3 item to be in Figure 3?</p> <p>4 A. That -- that is -- I would understand that to</p> <p>5 be a buffer that's -- that is queuing a cid requests for</p> <p>6 sending a response back from this block.</p> <p>7 Q. All right. Let's turn back to your</p> <p>8 declaration. I'll start with paragraph 89.</p> <p>9 A. I'm sorry, I missed the end of that sentence.</p> <p>10 Q. Can you turn to paragraph 89 of your</p> <p>11 declaration.</p> <p>12 A. Okay. I'm there.</p> <p>13 Q. Second sentence you state:</p> <p>14 "I understand Radulescu2004 was</p> <p>15 presented at the DATE'04 conference</p> <p>16 (February 2004) in Paris, France."</p> <p>17 Do you see that?</p> <p>18 A. Yes.</p> <p>19 Q. What is the basis for your understanding that</p> <p>20 Radulescu2004 was presented at the DATE'04 conference?</p> <p>21 A. I was informed by the attorneys that it was.</p> <p>22 Q. Okay. And so you don't have any personal</p> <p>23 knowledge as to whether Radulescu was presented at the</p> <p>24 DATE conference, correct?</p> <p>25 A. I do not.</p>

<p style="text-align: right;">Page 89</p> <p>1 Q. And you're not offering any opinions in your</p> <p>2 declaration with respect to whether Radulescu2004 is</p> <p>3 prior art, correct?</p> <p>4 A. Repeat that question, please.</p> <p>5 Q. Sure.</p> <p>6 You're not offering an opinion in your</p> <p>7 declaration that Radulescu2004 qualifies as prior art to</p> <p>8 the '052 patent, correct?</p> <p>9 A. That is -- that is a legal matter. No, I am</p> <p>10 not offering a legal opinion.</p> <p>11 Q. Okay. Sorry, we're going to need to jump</p> <p>12 around here for a second. If you could turn back to the</p> <p>13 claims of the '052 patent. Let's take a look at Claim 6</p> <p>14 to start.</p> <p>15 A. Okay. I'm there.</p> <p>16 Q. All right. At line 13 claim recites:</p> <p>17 "... wherein said at least one</p> <p>18 communication service identification</p> <p>19 comprises at least one communication</p> <p>20 thread or at least one address</p> <p>21 range ..."</p> <p>22 Do you see that?</p> <p>23 A. Yes.</p> <p>24 Q. In your declaration you've opined that</p> <p>25 Radulescu2004 discloses at least one address range,</p>	<p style="text-align: right;">Page 91</p> <p>1 depending upon context, could refer to an address range.</p> <p>2 Q. Let's go back to Figure 4 of the '052 patent.</p> <p>3 Let me know when you're there.</p> <p>4 A. Okay. I'm there.</p> <p>5 Q. Let's use S2 as an example. The address range</p> <p>6 for S2 is 8000-FFFF, right?</p> <p>7 A. Correct.</p> <p>8 Q. And so the 8000 on the left of the dash,</p> <p>9 that's one address, right?</p> <p>10 A. In this embodiment, yes.</p> <p>11 Q. And then FFFF on the right side of the dash is</p> <p>12 a different address, right?</p> <p>13 A. Correct.</p> <p>14 Q. And so what makes this an address range is</p> <p>15 that two individual addresses are listed together,</p> <p>16 right?</p> <p>17 A. That's an example of one way to specify an</p> <p>18 address range, yes.</p> <p>19 Q. And in this example if you only specified</p> <p>20 8000, you've only specified an address, right?</p> <p>21 A. In the example you've given the answer is yes.</p> <p>22 But there are other ways to designate an address range.</p> <p>23 That's when I answered you earlier, I said it depends on</p> <p>24 context.</p> <p>25 Q. In the context of this particular example in</p>
<p style="text-align: right;">Page 90</p> <p>1 correct?</p> <p>2 A. Correct.</p> <p>3 Q. But you do not opine in your declaration that</p> <p>4 Radulescu2004 discloses at least one communication</p> <p>5 thread, correct?</p> <p>6 A. That is correct.</p> <p>7 Q. Would you agree that a person of ordinary</p> <p>8 skill in the art would understand that there's a</p> <p>9 difference between an address and an address range?</p> <p>10 A. No. I don't. I don't agree. An address</p> <p>11 could refer to an address range. So depending -- it</p> <p>12 depends on the context.</p> <p>13 Q. In what context can an address be the same</p> <p>14 thing as an address range?</p> <p>15 A. An address could refer to an address range.</p> <p>16 Q. Can you give me an example of that?</p> <p>17 A. Sure. You can use, for example, a base</p> <p>18 address and that base address, the most significant part</p> <p>19 of it could refer to a base address and the least</p> <p>20 significant part of it could refer to the range. So,</p> <p>21 for example, if you have a base address and then -- so</p> <p>22 the context if you understand that's an address range,</p> <p>23 then the least significant parts could be -- go from,</p> <p>24 for example, zero zero, let's say it's the last two</p> <p>25 digits all the way to FF. So an address can --</p>	<p style="text-align: right;">Page 92</p> <p>1 Figure 4, the address 8000 is not an address range. Do</p> <p>2 we agree on that?</p> <p>3 A. I agree.</p> <p>4 Q. Okay. If we turn to -- back to Radulescu, go</p> <p>5 to Section 4.2 on page 4. Let me know when you're</p> <p>6 there, I'll point you to the paragraph.</p> <p>7 A. "NI Shells Architectures"?</p> <p>8 Q. Correct.</p> <p>9 And I want to ask you about the third</p> <p>10 paragraph that starts with "In Figure 3."</p> <p>11 Do you see that?</p> <p>12 A. Yes.</p> <p>13 Q. And I have the wrong one. I do have the wrong</p> <p>14 one. Let's go to the next paragraph.</p> <p>15 Do you see the paragraph that starts with "We</p> <p>16 implement the narrowcast connection"?</p> <p>17 A. Yes.</p> <p>18 Q. All right. The third sentence of that</p> <p>19 paragraph reads:</p> <p>20 "The address range assigned to a</p> <p>21 slave is configurable in the</p> <p>22 narrowcast module."</p> <p>23 Do you see that?</p> <p>24 A. Yes.</p> <p>25 Q. This is the only time that Radulescu2004</p>

<p style="text-align: right;">Page 93</p> <p>1 expressly uses the term "address range," correct?</p> <p>2 A. Yes.</p> <p>3 Q. And Radulescu is describing the address range</p> <p>4 in connection with assigning -- strike that.</p> <p>5 Radulescu2004 is describing the address range</p> <p>6 as being configurable in the narrowcast module, correct?</p> <p>7 MR. VANDENBURGH: Can I have that question</p> <p>8 read back?</p> <p>9 (Last question read as follows:</p> <p>10 COURT REPORTER: "Radulescu2004 is</p> <p>11 describing the address range as being</p> <p>12 configurable in the narrowcast</p> <p>13 module, correct?")</p> <p>14 MR. VANDENBURGH: Objection, form.</p> <p>15 A. That's -- that's what this sentence says. The</p> <p>16 address range assigned to a slave is configurable in the</p> <p>17 narrowcast module.</p> <p>18 BY MR. CHRISTOPHER:</p> <p>19 Q. Would a person of ordinary skill in the art</p> <p>20 understand that the address range is saved in the</p> <p>21 narrowcast module?</p> <p>22 A. It's configurable in the narrowcast module. I</p> <p>23 wouldn't say that that's the only place it's stored.</p> <p>24 It's stored somewhere else.</p> <p>25 Q. Would a person of skill in the art understand</p>	<p style="text-align: right;">Page 95</p> <p>1 A. Okay. Page 65 bottom left.</p> <p>2 Q. Which is page 62 if you're looking at the</p> <p>3 middle.</p> <p>4 A. Correct.</p> <p>5 Q. All right. Are you there?</p> <p>6 A. Yes.</p> <p>7 Q. Perfect. The paragraph after the one that</p> <p>8 starts with "Third" states:</p> <p>9 [As read.]</p> <p>10 "Radulescu2004 states that the</p> <p>11 requests from a master IP module</p> <p>12 include an address that identifies a</p> <p>13 slave and/or a memory within the</p> <p>14 slave module."</p> <p>15 Do you see that?</p> <p>16 A. Yes.</p> <p>17 Q. Where does Radulescu state that the request</p> <p>18 includes an address that identifies a memory within the</p> <p>19 slave module?</p> <p>20 A. So if you -- I mean, there's quite a few</p> <p>21 paragraphs below that that's talking about the address</p> <p>22 and the request going to the slave. But let me -- so</p> <p>23 I'm referring to all of it. But let me point you to</p> <p>24 one, one spot that's specifically talking about an</p> <p>25 address space within a slave.</p>
<p style="text-align: right;">Page 94</p> <p>1 that the address range could be stored in the narrowcast</p> <p>2 module?</p> <p>3 A. Could be stored in the narrowcast module, yes.</p> <p>4 Q. And the narrowcast module described in</p> <p>5 Radulescu2004, that is inside the network interface,</p> <p>6 correct?</p> <p>7 A. It could be, yes.</p> <p>8 Q. Does Radulescu2004 describe the narrowcast</p> <p>9 module as being anywhere other than inside the network</p> <p>10 interface?</p> <p>11 A. Let me -- let me look.</p> <p>12 Radulescu describes the -- I'm sorry, what was</p> <p>13 the question? Can you repeat the question?</p> <p>14 Q. Does Radulescu2004 describe the narrowcast</p> <p>15 module as being anywhere other than inside the network</p> <p>16 interface?</p> <p>17 A. Not that I can see now.</p> <p>18 Q. Okay. Let's go back to paragraph 124 of your</p> <p>19 declaration, please.</p> <p>20 A. Okay.</p> <p>21 Q. The question relates to something in the table</p> <p>22 in this paragraph which is on page 65 of the PDF.</p> <p>23 A. At the bottom left?</p> <p>24 Q. Yes. I'm going to refer to that because</p> <p>25 that's the PDF number.</p>	<p style="text-align: right;">Page 96</p> <p>1 So if you look at the bottom of page 66,</p> <p>2 bottom left page 66, middle is page 63. If you look at</p> <p>3 the bottom excerpt from Radulescu and I have it</p> <p>4 highlighted in yellow but I'll start from the beginning</p> <p>5 of the sentence. It says:</p> <p>6 "Within a narrowcast connection,</p> <p>7 the slave for which the transaction</p> <p>8 is destined is selected based on the</p> <p>9 address," in parentheses, "(Conn</p> <p>10 block). The address range assigned</p> <p>11 to a slave is configurable in the</p> <p>12 narrowcast module."</p> <p>13 Q. Are you finished with your answer?</p> <p>14 A. No. No, I lost the -- let me get to it again.</p> <p>15 Oh, it's the paragraph before it.</p> <p>16 So then going to the paragraph before it where</p> <p>17 halfway through just below where the yellow is</p> <p>18 highlighted, it says:</p> <p>19 "Narrowcast connections provide a</p> <p>20 simple, low-cost solution for a</p> <p>21 single shared address space mapped</p> <p>22 on multiple memories."</p> <p>23 So if you read Figure 3 that's talking about</p> <p>24 address ranges, address ranges associated with -- with a</p> <p>25 slave, and the fact that there's address space mapped to</p>

<p style="text-align: right;">Page 97</p> <p>1 multiple memories, one of ordinary skill in the art</p> <p>2 would understand that -- my statement that an address</p> <p>3 that identifies a slave and/or a memory within a slave</p> <p>4 module. That's the evidence I have.</p> <p>5 Q. So one of skill in the art -- strike that.</p> <p>6 Your view is that one of skill in the art</p> <p>7 would understand that the address identifies a memory</p> <p>8 within the slave module but Radulescu2004 doesn't</p> <p>9 expressly say that; is that right?</p> <p>10 A. I don't think that's what I said. I think</p> <p>11 Radulescu does disclose exactly what I said, which is an</p> <p>12 address that identifies a slave and/or a memory within a</p> <p>13 slave module. And that's expressly described when</p> <p>14 talking about the narrowcast shell in Figure 3. So</p> <p>15 taking the two paragraphs together, it is disclosed, in</p> <p>16 my opinion.</p> <p>17 Q. Is the slave assigned an address range in the</p> <p>18 narrowcast module?</p> <p>19 A. The address range is assigned to a slave is</p> <p>20 configurable in the narrowcast module, yes.</p> <p>21 MR. CHRISTOPHER: This is probably a good</p> <p>22 stopping point for lunch, so go off the record.</p> <p>23 COURT REPORTER: Off the record at 1:09 p.m.</p> <p>24 (Lunch recess was taken from</p> <p>25 1:09 p.m. to 2:04 p.m.)</p>	<p style="text-align: right;">Page 99</p> <p>1 next page. Focus on the paragraph -- it's one, two,</p> <p>2 three, four down. It starts with "We implement."</p> <p>3 Do you see that?</p> <p>4 A. I do.</p> <p>5 Q. Okay. The second sentence reads:</p> <p>6 "Within a narrowcast connection,</p> <p>7 the slave for which the transaction</p> <p>8 is destined is selected based on the</p> <p>9 address (Conn block)."</p> <p>10 Do you see that?</p> <p>11 A. I do.</p> <p>12 Q. Radulescu's never connid chip can identify</p> <p>13 which slave module is being targeted using the address,</p> <p>14 correct?</p> <p>15 A. Yes.</p> <p>16 Q. Okay. And then in the following sentence</p> <p>17 Radulescu states -- sorry, one more sentence after that.</p> <p>18 Radulescu states:</p> <p>19 "To provide in-order response</p> <p>20 delivery, the narrowcast must also</p> <p>21 keep a history of connection</p> <p>22 identifiers of the transactions</p> <p>23 including responses (e.g., reads and</p> <p>24 acknowledged writes), and the length</p> <p>25 of these responses."</p>
<p style="text-align: right;">Page 98</p> <p>1 COURT REPORTER: Back on the record at</p> <p>2 2:04 p.m.</p> <p>3 BY MR. CHRISTOPHER:</p> <p>4 Q. Welcome back, Dr. Hassoun. Did you discuss</p> <p>5 your testimony with anyone during our lunch break?</p> <p>6 A. I did not.</p> <p>7 Q. All right. Before the break we were</p> <p>8 discussing Radulescu2004. I'll ask you to bring that up</p> <p>9 and turn to Section 4.1, which is on page 3. Let me</p> <p>10 know when you're there.</p> <p>11 A. Okay. I'm there.</p> <p>12 Q. All right. The second paragraph under</p> <p>13 Section 4.1, the second sentence reads:</p> <p>14 "A port can have multiple</p> <p>15 connections to allow differentiated</p> <p>16 traffic classes, in which case there</p> <p>17 are also connid signals to select on</p> <p>18 which connection a message is</p> <p>19 supplied or consumed."</p> <p>20 Do you see that?</p> <p>21 A. Yes.</p> <p>22 Q. Would you agree that Radulescu2004 allows for</p> <p>23 differentiated traffic classes?</p> <p>24 A. Yes.</p> <p>25 Q. Let's turn to Section 4.2, which is on the</p>	<p style="text-align: right;">Page 100</p> <p>1 Do you see that?</p> <p>2 A. Yes.</p> <p>3 Q. Would you agree that Radulescu2004 provides</p> <p>4 in-order response delivery?</p> <p>5 A. Yes.</p> <p>6 MR. CHRISTOPHER: I have introduced</p> <p>7 Exhibit 1007 into the Zoom chat.</p> <p>8 (Exhibit 1007 was previously marked</p> <p>9 for identification by the Certified</p> <p>10 Shorthand Reporter.)</p> <p>11 BY MR. CHRISTOPHER:</p> <p>12 Q. If you could open that up and let me know when</p> <p>13 you're there, that would be great.</p> <p>14 A. Okay. I'm there.</p> <p>15 Q. Great. Let's turn to paragraph 1 of Weber,</p> <p>16 which is on page 18 of the PDF.</p> <p>17 A. Okay. I'm there.</p> <p>18 Q. All right. Weber states that it "... relates</p> <p>19 to a communication system to couple computing</p> <p>20 subsystems."</p> <p>21 Do you see that?</p> <p>22 A. Yes.</p> <p>23 Q. The communication system used by Weber is a</p> <p>24 shared bus, correct?</p> <p>25 A. Not only a shared bus, there's a multitude of</p>

<p style="text-align: right;">Page 101</p> <p>1 disclosures of different communication systems in the 2 record.</p> <p>3 Q. Do we agree that at least one of the 4 communication systems disclosed in Weber is a shared 5 bus?</p> <p>6 A. Multiple buses, yes.</p> <p>7 Q. If you could turn to paragraph 3, Weber, he 8 states:</p> <p>9 "One challenge in the 10 integration, verification and 11 testing of modern electronic systems 12 stems from the fact that modern 13 electronic systems in many 14 application areas have 15 functionality, cost and form-factor 16 requirements that mandate the 17 sharing of resources, such as 18 memory, among multiple functional 19 blocks where functional blocks can 20 be any entity that interfaces to a 21 communication system." 22 Do you see that?</p> <p>23 A. Yes.</p> <p>24 Q. Okay. Form-factor requirements refer to how 25 much physical space something takes up on the chip,</p>	<p style="text-align: right;">Page 103</p> <p>1 A. Okay.</p> <p>2 Q. He states here:</p> <p>3 "One disadvantage of computer 4 buses is that each subsystem or 5 component connected to the bus is 6 constrained to use the protocol of 7 the bus. In some cases, this limits 8 the performance of the subsystem." 9 Do you see that?</p> <p>10 A. Yes.</p> <p>11 Q. And so here Weber is describing a disadvantage 12 associated with computer buses, correct?</p> <p>13 A. With a type of a computer bus where all the 14 participants in the subsystems are adhering to the 15 protocol of the bus.</p> <p>16 Q. And in that example Weber is teaching that 17 this limits the performance of the subsystem, right?</p> <p>18 A. It could limit the performance of a subsystem, 19 that's what they're saying.</p> <p>20 Q. And then paragraph 7. Let me know when you're 21 there, just underneath.</p> <p>22 A. Yep.</p> <p>23 Q. Paragraph 7 Weber writes: 24 "Current bus systems provide 25 limited capability to preserve order</p>
<p style="text-align: right;">Page 102</p> <p>1 right?</p> <p>2 A. That's -- that's an understanding I can agree 3 with, yes.</p> <p>4 Q. I'm sorry, I'm having a hard time hearing you.</p> <p>5 A. Yes. I agree with, but form factor not only 6 refers to the size it also -- one of ordinary skill in 7 the art would understand it would refer also to the 8 shape, the -- the geometry as well.</p> <p>9 Q. Would you agree that --</p> <p>10 MR. VANDENBURGH: I'm sorry, Angelo. Are you 11 having issues with our sound?</p> <p>12 MR. CHRISTOPHER: Much better now. Whatever 13 you changed, you fixed it.</p> <p>14 BY MR. CHRISTOPHER:</p> <p>15 Q. Would you agree that a smaller form factor is 16 desirable in designing a system on a chip?</p> <p>17 A. I can't make that general statement. It 18 depends -- you're going to have to show me the system 19 for me to, you know, affirmatively say that. But if 20 we're talking about an integrated circuit, there's many 21 considerations that you have to take into account when 22 it comes to, you know, smaller or larger. So it's 23 desirable depending on what your constraints are for 24 designing that system.</p> <p>25 Q. If you could turn to paragraph 6 of Weber.</p>	<p style="text-align: right;">Page 104</p> <p>1 in one transaction stream by 2 supporting 'split transactions' in 3 which data from one transaction may 4 be interleaved with data from 5 another transaction in the same 6 stream." 7 Do you see that?</p> <p>8 A. Yes.</p> <p>9 Q. So this is another limitation of existing bus 10 systems that Weber is describing, correct?</p> <p>11 A. Well, again a single bus, yes.</p> <p>12 Q. Then in paragraph 9 he states, it's in the 13 last sentence:</p> <p>14 "Therefore, it is desirable for a 15 communications system and mechanism 16 to allow subsystems of a large, 17 complex electronics system to 18 interoperate efficiently regardless 19 of their varying performance 20 characteristics and requirements." 21 Do you see that?</p> <p>22 A. Yes.</p> <p>23 Q. Would you agree that one of Weber's goals is 24 to allow large, complex electronics systems to operate 25 efficiently?</p>

<p style="text-align: right;">Page 105</p> <p>1 A. Regardless of their varying performance</p> <p>2 characteristics and requirements, yes.</p> <p>3 Q. And Weber teaches that invention is able to</p> <p>4 allow large, complex electronic systems to operate</p> <p>5 efficiently, right?</p> <p>6 A. Regardless of their varying performance</p> <p>7 characteristics and requirements, yes.</p> <p>8 Q. Okay. Let's go to Figure 1 of Weber.</p> <p>9 A. Okay. I'm there.</p> <p>10 Q. All right. Let's do something similar to what</p> <p>11 we did with the figures in the '052 patent and talk</p> <p>12 about what these things mean in Figure 1. So reference</p> <p>13 No. 100 is referring to the overall system, right?</p> <p>14 A. Correct.</p> <p>15 Q. Okay. And then reference No. 102, that is</p> <p>16 referring to an integrated circuit, correct?</p> <p>17 A. It's referencing to integrated circuit 102 but</p> <p>18 it also could be part of an integrated circuit 100.</p> <p>19 There is disclosure that 100 as well as (inaudible)--</p> <p>20 (Court reporter clarification.)</p> <p>21 A. -- Figure 1 is used for --</p> <p>22 Sure. I think what's happening is when I'm</p> <p>23 looking at the figure while talking it's -- it's getting</p> <p>24 muffled. So I'll repeat my answer or paraphrase my</p> <p>25 answer. I don't remember it exactly.</p>	<p style="text-align: right;">Page 107</p> <p>1 Q. And subsystems A, B, C, D --</p> <p>2 MR. VANDENBURGH: I don't think the witness</p> <p>3 answered the question yet. He was checking.</p> <p>4 A. I'm sorry. Should I go check to verify that</p> <p>5 they are called subsystems?</p> <p>6 BY MR. CHRISTOPHER:</p> <p>7 Q. You're not sure if they are called subsystems</p> <p>8 without consulting Weber's description?</p> <p>9 A. I want to be accurate in my answer, so there's</p> <p>10 several papers that I've considered.</p> <p>11 Q. Okay. You can go ahead and confirm that and</p> <p>12 let me know when you've confirmed that.</p> <p>13 A. It will take me a second.</p> <p>14 Yes. It refers to them as functional blocks</p> <p>15 or subsystems.</p> <p>16 Q. Okay. And the subsystems, functional blocks</p> <p>17 A, B, C, D and E communicate with one another via a</p> <p>18 shared bus 114, right?</p> <p>19 A. Via shared bus 114 and interfaces -- at least</p> <p>20 interfaces 120, 121, 122, 123 and 124.</p> <p>21 Q. The block labeled with the letter F within 102</p> <p>22 is not expressly described in Weber, correct?</p> <p>23 A. It is not expressly described in Weber but I</p> <p>24 believe it's -- it's a typo in Weber. Regardless, one</p> <p>25 of ordinary skill in the art would understand that A, B,</p>
<p style="text-align: right;">Page 106</p> <p>1 Can you ask the question again,</p> <p>2 Mr. Christopher, please?</p> <p>3 BY MR. CHRISTOPHER:</p> <p>4 Q. Sure.</p> <p>5 Reference No. 102 in Figure 1 of Weber is</p> <p>6 referring to an integrated circuit, correct?</p> <p>7 A. So in one embodiment, yes, it's an integrated</p> <p>8 circuit. In another embodiment it's part of a larger</p> <p>9 integrated circuit 100.</p> <p>10 Q. In this example in Figure 1 it is a separate</p> <p>11 integrated circuit, right?</p> <p>12 A. In one embodiment it is. There is another</p> <p>13 embodiment that refers to 100 as an integrated circuit,</p> <p>14 a single integrated circuit.</p> <p>15 Q. The embodiment in which it is a separate</p> <p>16 integrated circuit is this an embodiment in Figure 1,</p> <p>17 right?</p> <p>18 A. It -- yes.</p> <p>19 Q. Okay. All right. Within the integrated</p> <p>20 circuit 102 there are a number of blocks labeled A, B,</p> <p>21 C, D and E. Do you see those?</p> <p>22 A. Yes.</p> <p>23 Q. Those are called subsystems in Weber, right?</p> <p>24 A. I think so. I'll have to go look to verify</p> <p>25 that that's what they call them.</p>	<p style="text-align: right;">Page 108</p> <p>1 C, D, E and F in 102 are functional blocks.</p> <p>2 Q. So your understanding is that F is a</p> <p>3 functional block or subsystem similar to A, B, C, D and</p> <p>4 E; is that right?</p> <p>5 A. Yes.</p> <p>6 Q. Okay. And then below 102 in Figure 1 we have</p> <p>7 an item labeled 104. Do you see that?</p> <p>8 A. Yes.</p> <p>9 Q. 104 is an ASIC, right?</p> <p>10 A. Yes.</p> <p>11 Q. What is an ASIC?</p> <p>12 A. So an ASIC -- the acronym stands for an</p> <p>13 application specific integrated circuit. So the same as</p> <p>14 my answer in 102. In one embodiment it is a standalone</p> <p>15 ASIC and another one in another embodiment it's</p> <p>16 integrated on a single chip with -- in system 100.</p> <p>17 Q. And in this embodiment that's illustrated in</p> <p>18 Figure 1, the ASIC is illustrated as a separate</p> <p>19 integrated chip, right?</p> <p>20 A. In the embodiment where it is a separate</p> <p>21 integrated chip, yes.</p> <p>22 Q. And that --</p> <p>23 (Simultaneous cross-talk.)</p> <p>24 BY MR. CHRISTOPHER:</p> <p>25 Q. Sorry, were you finished with your answer?</p>

<p>1 A. I said integrated chip, I meant integrated 2 circuit.</p> <p>3 Q. And then in the top right-hand corner of 4 Figure 1 we have items 106 and 108. Do you see those?</p> <p>5 A. Yes.</p> <p>6 Q. Those are memory, correct?</p> <p>7 A. Yes.</p> <p>8 Q. And then one of the last major item here in 9 Figure 1 is labeled 110. Do you see that?</p> <p>10 A. Yes.</p> <p>11 Q. And that's labeled FPGA, right?</p> <p>12 A. Yes.</p> <p>13 Q. What is an FPGA?</p> <p>14 A. It stands for field programmable gate array.</p> <p>15 Q. What does an FPGA do?</p> <p>16 A. So an FPGA is a programmable logic where the 17 functionality of the logic can be programmed later after 18 the chip -- or after that block is manufactured. So you 19 can later create different functionality or a customer 20 can create different functionality in that FPGA.</p> <p>21 Q. All right. Item 112 in Figure 1 is a shared 22 bus, right?</p> <p>23 A. Yes.</p> <p>24 Q. And in this embodiment shown in Figure 1, the 25 shared bus is used to communicate between 102, 104, 106,</p>	<p>Page 109</p> <p>1 Q. Okay. The claims of the '052 patent require 2 an interface -- network interface, correct?</p> <p>3 A. Correct.</p> <p>4 Q. And you've opined that the interface 120 in 5 Figure 1 of Weber corresponds to the claimed network 6 interface, correct?</p> <p>7 A. It's an example of one of the network 8 interfaces, yes.</p> <p>9 Q. Would the item labeled with reference No. 128 10 within FPGA 110, would that also correspond to a network 11 interface as that term is used in the '052 patent?</p> <p>12 A. Yes.</p> <p>13 Q. Okay. You've opined in your declaration that 14 Figure 1 of Radulescu illustrates a multihop 15 interconnect separated by one or more network nodes, 16 correct?</p> <p>17 A. I'm sorry, did we switch to Radulescu? Did 18 you say Radulescu?</p> <p>19 Q. I did. I misspoke. Let's try that again. 20 You've opined in your declaration that 21 Figure 1 of Weber illustrates a multihop interconnect 22 separated by one or more network nodes, correct?</p> <p>23 A. Yes.</p> <p>24 Q. Okay. And you've identified -- maybe I should 25 go to your declaration. Page 136 of the PDF of your</p>
<p>Page 110</p> <p>1 108 and 110, correct?</p> <p>2 A. Yes, through the interface modules.</p> <p>3 Q. I want to understand how you've mapped the 4 disclosure in Figure 1 to the claims of the '052 patent. 5 You have opined in your declaration that the functional 6 block A can correspond to the first processing module, 7 correct?</p> <p>8 A. Correct.</p> <p>9 Q. And then you have identified in your 10 declaration the FPGA 110 as the second processing module 11 in the claim, correct?</p> <p>12 A. No. I've identified -- I believe I've 13 identified module A within the FPGA 110 as the second 14 processing module. I would have to check.</p> <p>15 Would you like me to go check that?</p> <p>16 Q. Yes.</p> <p>17 Can you confirm what you are opining is the 18 second processing module in Figure 1?</p> <p>19 A. Yes.</p> <p>20 Q. Are you still looking to confirm that?</p> <p>21 A. Yes.</p> <p>22 I've identified at least the block 110 -- 23 subsystem A of block 110 as the -- as a slave module. 24 Or a second processing module, the second processing 25 module.</p>	<p>Page 112</p> <p>1 declaration.</p> <p>2 MR. VANDENBURGH: PDF being the lower 3 left-hand corner?</p> <p>4 MR. CHRISTOPHER: Correct.</p> <p>5 A. Yes, I'm there.</p> <p>6 BY MR. CHRISTOPHER:</p> <p>7 Q. All right. And here you have annotated 8 Figure 1 of Weber to show multiple hops, correct?</p> <p>9 A. Correct.</p> <p>10 Q. Okay. And you're showing that the first hop 11 is between functional block A and the block labeled 124; 12 is that right?</p> <p>13 A. The first hop is between A and bus 114 14 through 120. That's the first hop. And another hop is 15 between bus 114 to bus, point-to-point bus 115 16 through 124. And then another hop through F to -- back 17 to a shared bus 112. And then a hop from 128 to the 18 shared bus 114 in the FPGA.</p> <p>19 Q. So it's your opinion that there are five hops 20 shown in Figure 1 of Weber?</p> <p>21 A. Four hops.</p> <p>22 Q. So your opinion is that a connection between a 23 processing module and a shared bus, that's a hop?</p> <p>24 A. No, that's not what I said.</p> <p>25 Q. Between A and bus 114 in Figure 1, is it your</p>

<p style="text-align: right;">Page 113</p> <p>1 opinion that this is a hop because interface 120 is</p> <p>2 between the functional block A and the shared bus 114?</p> <p>3 A. It's because -- so 120 is a hop. It's because</p> <p>4 you have two different buses that you're -- need an</p> <p>5 interface in order to go from one to the other. So in</p> <p>6 115 you have a point-to-point bus. And 114 is a shared</p> <p>7 bus. Therefore, to go from 115 to 114 you need module</p> <p>8 interface 120 in order for you to connect the two so</p> <p>9 that is a network node and therefore is a hop.</p> <p>10 Q. And then your opinion is that between block</p> <p>11 124 and functional block F on the right-hand side, is</p> <p>12 that a hop?</p> <p>13 A. Well, 115 is the bus. So the hop is between</p> <p>14 shared bus 114 and point-to-point bus 115 and 124 is the</p> <p>15 network node that is the hop.</p> <p>16 Q. So is it your opinion that two shared buses</p> <p>17 connected in series with an interface between them would</p> <p>18 have a hop?</p> <p>19 A. You're going to have to show me those two</p> <p>20 shared buses and show me what that -- what the interface</p> <p>21 is and I'll opine on that. Weber is not -- the</p> <p>22 disclosure in Weber is jumping from different types of</p> <p>23 buses, therefore there's an interface that is required</p> <p>24 to perform that translation between a point-to-point bus</p> <p>25 115 to shared bus 114 to -- back to a different</p>	<p style="text-align: right;">Page 115</p> <p>1 A. No, that's not -- that's not correct.</p> <p>2 Q. Weber doesn't describe the physical components</p> <p>3 that makes up the communication subsystem, does it?</p> <p>4 A. Well, Weber has explanations of what the</p> <p>5 functionality of the communication subsystem and uses</p> <p>6 figures, for example, 15B and I believe Figure 20</p> <p>7 represent what the communication subsystem is.</p> <p>8 (Court reporter clarification.)</p> <p>9 BY MR. CHRISTOPHER:</p> <p>10 Q. Figure 20 of Weber is showing a number of</p> <p>11 ports as part of the communication subsystem, right?</p> <p>12 A. Correct.</p> <p>13 Q. And, beyond showing these ports, Figure 20</p> <p>14 does not propose any other components for the</p> <p>15 communications subsystem, correct?</p> <p>16 A. In the figure there is no other component</p> <p>17 shown. I can go to the description and see if one</p> <p>18 skilled in the art would understand other components in</p> <p>19 there.</p> <p>20 Q. Let's go to paragraph 204 of your declaration.</p> <p>21 Let me know when you're there. This is on page 139 of</p> <p>22 the PDF.</p> <p>23 A. I'm there.</p> <p>24 Q. Okay. So in this paragraph at the bottom you</p> <p>25 state:</p>
<p style="text-align: right;">Page 114</p> <p>1 point-to-point bus 115 to another shared bus 112 and</p> <p>2 then to another shared bus 114. So, the transition, at</p> <p>3 least the transitions from a point-to-point bus in Weber</p> <p>4 and the shared bus in Weber is a hop.</p> <p>5 Q. Is that contingent on the fact that there's an</p> <p>6 interface between the point-to-point bus and the shared</p> <p>7 bus?</p> <p>8 A. Yes, there's a network node there. There's a</p> <p>9 node there that's required to perform that translation</p> <p>10 because if you look, for example, at module D in that</p> <p>11 figure, module D doesn't have a network node between D</p> <p>12 and 114, which means D is using the same protocol as bus</p> <p>13 114.</p> <p>14 Q. Let's turn to Figure 14 of Weber.</p> <p>15 A. Okay.</p> <p>16 Q. So Figure 14 is a different embodiment in</p> <p>17 Weber than the embodiment we were just discussing in</p> <p>18 Figure 1, correct?</p> <p>19 A. Yes.</p> <p>20 Q. Okay. And in Figure 14 there are two</p> <p>21 communication subsystems, one of them is labeled 1435,</p> <p>22 the other 1440. Do you see those?</p> <p>23 A. Yes.</p> <p>24 Q. Weber doesn't expressly describe what those</p> <p>25 communication subsystems 1435 and 1440 are, correct?</p>	<p style="text-align: right;">Page 116</p> <p>1 [As read.]</p> <p>2 "A POSA would also envisage that</p> <p>3 the communication subsystems 1435</p> <p>4 and 1440 would be routers or</p> <p>5 respective shared buses of the</p> <p>6 system 100."</p> <p>7 Do you see that?</p> <p>8 A. Yes.</p> <p>9 Q. Weber doesn't expressly disclose that the</p> <p>10 communication subsystems are routers, correct?</p> <p>11 A. Not explicitly, no, but one of ordinary skill</p> <p>12 in the art reading the description would understand that</p> <p>13 it could be routers or respective shared buses.</p> <p>14 Q. Earlier when we were talking about the</p> <p>15 '052 patent and networks on a chip we talked about how</p> <p>16 the network and a network on a chip transmits packets.</p> <p>17 A. It can transmit packets, yes.</p> <p>18 Q. Weber does not disclose transmitting packets</p> <p>19 over a shared bus, correct?</p> <p>20 A. No, it does not.</p> <p>21 Q. So just going back to your annotation on</p> <p>22 page 136 PDF of the declaration. Let me know when</p> <p>23 you're there.</p> <p>24 A. I'm there.</p> <p>25 Q. So, along the red lines that you've drawn from</p>

<p style="text-align: right;">Page 117</p> <p>1 functional block A in 102 and block A in 110, no packets 2 are being sent across those red lines, right? 3 A. Packets could be sent over those red lines. 4 Weber is silent regarding whether packets can or cannot 5 be sent on those red lines. 6 MR. CHRISTOPHER: Let's go off for a couple 7 minutes. 8 COURT REPORTER: Off the record at 2:51 p.m. 9 (Recess was taken from 2:51 p.m. 10 to 3:08 p.m.) 11 COURT REPORTER: Back on the record at 12 3:08 p.m. 13 BY MR. CHRISTOPHER: 14 Q. All right. Dr. Hassoun, did you discuss your 15 testimony with anyone during our break? 16 A. No. 17 Q. Okay. Back to your declaration, Exhibit 1003, 18 if you could turn to page 126 of the PDF. 19 A. 126? 20 Q. Yes, which the number in the middle of the 21 page at the bottom will be 123. 22 A. Okay. 23 Q. Okay. At the bottom of that page you state: 24 "In addition to the Thread ID, 25 Weber describes the functional</p>	<p style="text-align: right;">Page 119</p> <p>1 A. Yes. 2 Q. All right. And then on the next page you 3 continue on underneath where Figure 11 is reproduced and 4 you cite some disclosures from Weber. Do you see that? 5 A. Yes. 6 Q. And then at the paragraph at the bottom of 7 page 127 you state: 8 "A POSA would understand that 9 this discloses the capability of 10 issuing a request based on an 11 address range." 12 Do you see that? 13 A. Yes. 14 Q. Weber doesn't explicitly disclose an address 15 range, correct? 16 A. In my -- my -- my opinion on that is if you go 17 to page 129, so middle of page 126, in the middle, the 18 second paragraph from the bottom, I say: 19 [As read.] 20 "Because of this address signal 21 and the address base disclosure of 22 this target, a POSA would understand 23 that their request is based on an 24 address range." 25 So the combination of disclosures or</p>
<p style="text-align: right;">Page 118</p> <p>1 blocks provide an 'address (Addr) 2 signal' with the request that 3 identifies 'a particular resource 4 that an initiator functional block 5 wishes to access.' 6 Do you see that? 7 A. No, I'm sorry. Bottom of that page ... 8 MR. VANDENBURGH: PDF page number, what's the 9 lower left? 10 MR. CHRISTOPHER: 126. 11 A. I'm there. Sorry, I was on the wrong page. 12 BY MR. CHRISTOPHER: 13 Q. All good. Bottom of that page, do you see the 14 sentence that starts with "In addition to the Thread 15 ID"? 16 A. Yes. 17 Q. And you state here: 18 "... Weber describes that the 19 functional blocks provide an 20 'address (Addr) signal' with the 21 request that identifies 'a 22 particular resource that an 23 initiator functional block wishes to 24 access.' 25 Do you see that?</p>	<p style="text-align: right;">Page 120</p> <p>1 explanation Weber would lead a POSA to understand that 2 the request is based on the -- on an address range. 3 Q. Right. I understand your opinion is that a 4 POSA would understand that. 5 But my question is, Weber doesn't expressly 6 disclose that the request is based on an address range, 7 correct? 8 MR. VANDENBURGH: Objection, form. 9 A. I think my conclusion here is that it does. 10 That's what I'm saying here, is given the explanation of 11 the structure of the base address and decoding that base 12 address, one would understand that is a disclosure of an 13 address range. 14 BY MR. CHRISTOPHER: 15 Q. Right. But Weber does not literally use the 16 words "address range," correct? 17 A. No. Weber does not use the words "address 18 range." 19 Q. Turn to paragraph 211 in your declaration. 20 A. Okay. I'm there. 21 Q. Second sentence of paragraph 211 states: 22 "The '052 patent states that the 23 network interface 'provides a 24 conversion of the packet-based 25 communication the network (N) to the</p>

<p style="text-align: right;">Page 121</p> <p>1 higher-level protocol (AHB, DTL, 2 MTL) that the IP modules of Fig. 1 3 use." 4 Do you see that? 5 A. Yes. 6 Q. So the '052 patent is teaching a conversion 7 between packet-based communication for the network and 8 protocols like AHB, DTL, MTL and OCP, right? 9 A. It's teaching an embodiment that does that, 10 yes. 11 Q. And earlier we discussed Weber does not 12 disclose packets, correct? 13 A. Yes. 14 Q. So Weber does not provide for conversion 15 between packet-based communication and higher-level 16 protocols like AHB, DTL and MTL, correct? 17 A. Well, Weber discloses to one that's skilled in 18 the art that it could be packet based or not. It 19 depends upon what protocol you choose. And the claims 20 of the '052 do not require packet-based communication. 21 Q. So my question's about Weber. If Weber does 22 not expressly disclose packets, then it does not 23 expressly disclose conversion between packet-based 24 communication and higher-level protocols, correct? 25 A. So Weber is not the same as this particular</p>	<p style="text-align: right;">Page 123</p> <p>1 Q. Please -- please do that and let me know. 2 A. So no, that's not -- the ThreadID itself is 3 not the request. If you scroll up just a little bit, 4 and I quote paragraph 123 of Weber, and if you look at 5 the highlighted yellow portion it says: 6 "A ThreadID is an identifier of 7 local scope that simply identifies 8 transfers between the interface 9 module and its connected functional 10 block." 11 Q. Is the ThreadID in Weber part of a request? 12 A. Yes, because it identifies transfers between 13 the interface module and its connected functional block. 14 Q. Is there anything else included in Weber's 15 requests other than the ThreadID? 16 A. If you look, for example, on page 133, bottom 17 left, which is paragraph 196, so the -- are you there? 18 Q. I'm there. 19 A. Okay. If you look at Figure 11, for example, 20 you have command, address, data out, at least as part of 21 the transfer request. 22 Q. If you'd go back to paragraph 114 [sic]. 23 A. Okay. I'm there. 24 Q. When you said "a ThreadID corresponds to a 25 request," what did you mean by that?</p>
<p style="text-align: right;">Page 122</p> <p>1 embodiment because -- oh, so ... because what you said. 2 Q. Okay. Go to paragraph 214 of your 3 declaration, please. 4 A. Okay. I'm there. 5 Q. All right. In paragraph 214 you state: 6 "Because a ThreadID corresponds 7 to a request as discussed above with 8 respect to element [6.pre 1] [sic], 9 a POSA would understand that mapping 10 a ThreadID to a CONNID also maps the 11 corresponding request to a 12 connection." 13 Do you see that? 14 MR. VANDENBURGH: I think you misspoke just a 15 little bit in there. You said 6 pre 1. I think it says 16 6 pre 2. 17 MR. CHRISTOPHER: It does say 6 pre 2. 18 BY MR. CHRISTOPHER: 19 Q. I want to focus you on the first half of that 20 sentence. Do you see where it says a "ThreadID 21 corresponds to a request"? 22 A. Yes. 23 Q. In Weber the ThreadID is the request, correct? 24 A. I'm not sure -- I'll look that up -- if the 25 ThreadID is the request.</p>	<p style="text-align: right;">Page 124</p> <p>1 A. I'm sorry. Did you say paragraph 114? 2 Q. 214. I may have said 114. 3 A. 214. 4 Q. I meant 214. 5 A. So what's the question? Sorry. 6 Q. When you said "a ThreadID corresponds to a 7 request," what did you mean by that? 8 A. So a ThreadID is part of our request. It's 9 associated with a request. That's what I meant. 10 Q. In paragraph 214 -- sorry. 215. You state: 11 "Weber also describes that the 12 address sent by the initiator 13 functional module is mapped to a 14 connection." 15 Do you see that? 16 A. Yes. 17 Q. So in Weber with respect to the address, the 18 address is mapped to the connection, correct? 19 A. Yes, but I described earlier what that address 20 signal can have in it and how it is decoded. 21 Q. In your declaration you have opined that it 22 would have been obvious to a person of skill in the art 23 to combine Weber and OCP -- excuse me. Let's try that 24 again. I got my references mixed up. 25 In your declaration you've opined that it</p>

<p style="text-align: right;">Page 125</p> <p>1 would have been obvious to a person of skill in the art 2 to combine Weber and Radulescu2004, correct? 3 A. Correct. 4 Q. In your proposed combination of Weber and 5 Radulescu, which components from Radulescu2004 would be 6 added to Weber? 7 A. So, for example, the network that is described 8 in Radulescu2004 could be substituted for the network 9 that is in Weber, for example, Figure 1. Figure 1 10 discloses a communication network between multiple 11 functional block. It discloses the interfaces there in 12 order to translate signals. So it would have been 13 obvious for one -- it would have been obvious for one of 14 skill in the art to make that replacement. 15 Q. So in your proposed combination the shared 16 buses in Weber would be replaced by Radulescu2004's 17 network; is that right? 18 A. The network in Weber is what I said, which 19 includes the shared buses, includes network nodes, 20 includes point-to-point buses in the middle, basically 21 those channels, those communication channels could be 22 replaced by Radulescu's network. 23 Q. Let's go to Figure 1 of Weber. 24 A. I'm there. 25 Q. All right. In the combination of Weber and</p>	<p style="text-align: right;">Page 127</p> <p>1 A. They might or might not. That would be an 2 obvious combination to do it and obvious not to do it, 3 depending on what the architecture ends up being, the 4 details of that coimplementation. 5 Q. So your opinion is that it would be obvious to 6 combine Weber and Radulescu2004 with Radulescu2004's 7 network interfaces or without Radulescu2004's network 8 interfaces? 9 A. Where -- where appropriate, yes. 10 Q. And in this combination that you've proposed, 11 in your view, what would be appropriate? 12 A. Use the network interfaces for Radulescu2004, 13 make that replacement. That's -- that's an obvious 14 combination. 15 Q. When you say "use the network interfaces for 16 Radulescu2004," you would then remove the interfaces 17 from Weber, right? 18 A. I would either remove the interfaces from 19 Weber or add the network interface in addition to 120, 20 whatever is appropriate. Radulescu2004 explains that 21 the other side of the network interface could be any 22 protocol, connection or connectionless protocols and he 23 gives examples of AXI, OCP, MTL, and then explains that 24 that network interface will tie into it. So if you put 25 Radulescu's network with the interfaces, you don't have</p>
<p style="text-align: right;">Page 126</p> <p>1 Radulescu2004, would the interfaces 120, 121, 122, 123, 2 would those be replaced? 3 A. You can use the -- one of ordinary skill in 4 the art would know what interfaces to use in order to go 5 from the protocol, for example 115, to the protocol of 6 the network that's in between the blocks. So those 120, 7 a combination between Radulescu and Weber, both -- they 8 both teach the 120 -- the interface modules 120. So the 9 replacement could or could not be replacing 120. One of 10 ordinary skill in the art looking at the architectures 11 of the two would know what to do. It's quite obvious. 12 Q. Let's -- let's back up a second. In the 13 Weber/Radulescu2004 combination would the point-to-point 14 bus 115 between functional block A and interface 120 15 remain after the combination? 16 A. That's a possibility, yes. It's up to the -- 17 one of ordinary skill in the art looking at the system 18 know what to do. They are both teaching the same 19 concepts and the two architectures, one of ordinary 20 skill in the art would know to make the appropriate 21 replacement where necessary. 22 Q. If the interfaces 120, 121, 122, 123 from 23 Weber remained after the combination with Radulescu2004, 24 would a person of ordinary skill in the art also include 25 Radulescu2004's network interfaces?</p>	<p style="text-align: right;">Page 128</p> <p>1 to remove 120, you just add it instead of the rest of 2 that network. And Radulescu readily teaches that. 3 Q. So one obvious combination, in your view, 4 would be to include Weber's interfaces and 5 Radulescu2004's network interfaces; is that right? 6 A. Yes. 7 Q. What would be the purpose of having both the 8 Weber interfaces and the Radulescu2004 network 9 interfaces? 10 A. It's an architectural decision at that point. 11 Q. Is there any advantage to having Weber's 12 interfaces and Radulescu2004's network interfaces? 13 A. One of ordinary skill in the art would look at 14 it on a case -- on a case-by-case basis. For example, 15 block B interface 121 is already built in to block B, so 16 you might not remove that and it's easier to just put 17 the network interface of Radulescu there. 18 Q. So in Weber Figure 1, functional block F is 19 between shared bus 114 and shared bus 112, right? 20 A. Well, it's between the point-to-point bus 115 21 and shared bus 112. 22 Q. So if shared bus 112 and shared bus 114 were 23 substituted for Radulescu2004's network, where would the 24 functional block F be implemented in the resulting 25 system?</p>

<p style="text-align: right;">Page 129</p> <p>1 A. Well, if -- it depends on what -- what block F 2 is. And in one understanding a POSA would understand, 3 as I explained, that block F is a bridge because what 4 it's doing, it's bridging between 115 to 112 in which 5 case Radulescu would not need to have block F over 6 there. If block F happens to have some functionality 7 beyond the bridge, one of ordinary skill in the art 8 would know to just put it on the Radulescu network.</p> <p>9 Q. In what circumstances would a POSITA combining 10 Weber and Radulescu2004 eliminate Weber's interfaces?</p> <p>11 A. Where you have network interfaces that can 12 translate -- that translate the protocol of, for 13 example, block A to the Radulescu's messages, for 14 example. That's an example where you would need 120.</p> <p>15 Q. What protocol does the functional blocks A, B, 16 C, D and E in Weber use?</p> <p>17 A. That's why the combination is quite obvious. 18 Neither Radulescu nor Weber discuss what the exact 19 protocol is. Radulescu gives you several examples of 20 protocols. Weber does not discuss the specific protocol 21 that's there -- actually, Radulescu -- sorry.</p> <p>22 Weber does have example of point-to-point 23 interface signals, so it does have some examples. But 24 that's why the combination is obvious in view of one of 25 skill in the art. One skilled in the art would know</p>	<p style="text-align: right;">Page 131</p> <p>1 ordinary skill in the art can build the adapter maybe 2 because they already have it to go from 120, the 3 protocol coming out of 120 into the Radulescu network.</p> <p>4 Q. So Claim 6 of the '052 patent recites a 5 mapping step. Do you recall that, we discussed that 6 earlier?</p> <p>7 A. Yes.</p> <p>8 Q. In the combination of Weber and Radulescu2004 9 which component is performing the mapping step in 10 Claim 6 of the '052 patent?</p> <p>11 A. So the network adapter -- the network 12 interface is able to do that mapping step. And in 13 Claims 1 and 7 the mapping means is even an adapter.</p> <p>14 Q. So in the Weber and Radulescu combination 15 you've proposed, the network interface from Radulescu is 16 the component that would be performing the mapping step 17 in the claim, correct?</p> <p>18 A. It -- it is one possibility, yes.</p> <p>19 Q. Are there other possible components that could 20 perform the mapping step in the claim?</p> <p>21 A. Yes, if -- if 120 is modified or already 22 provides that mapping.</p> <p>23 Q. All right. I want to talk about the 24 combination of Radulescu2004 and OCP. You have opined 25 in your declaration that it would have been obvious to a</p>
<p style="text-align: right;">Page 130</p> <p>1 what translation adapter module, for example, they need 2 to use to do that translation.</p> <p>3 Q. So the interfaces in Weber do the type of 4 translation you just discussed between the functional 5 block and the shared bus, right?</p> <p>6 A. Ask that question again.</p> <p>7 Q. Yes.</p> <p>8 The interfaces in Weber perform the 9 translation you just described so that the functional 10 block A, for example, can communicate with the shared 11 bus 114; is that right?</p> <p>12 A. The disclosure, if you look on Figure 1, 1 -- 13 block A goes to point-to-point bus 115. And then 14 point-to-point bus 115 goes to the shared bus 114 15 through 120. One of ordinary skill in the art would 16 understand that 120 must do the translation between the 17 point-to-point bus and the shared bus 114.</p> <p>18 Q. But if I eliminate shared bus 114 in the 19 combination with Radulescu2004, I wouldn't need the 20 module for interface 120 to translate between 21 point-to-point bus and a shared bus, correct?</p> <p>22 A. Sure. If you're designing that system, take 23 it out, build an adapter exactly like Radulescu teaches 24 you, and you can go from 115 straight into the Radulescu 25 network through its network interface. Or one of</p>	<p style="text-align: right;">Page 132</p> <p>1 person of skill in the art to combine Radulescu2004 and 2 OCP, correct?</p> <p>3 A. Yes.</p> <p>4 Q. In the combination of Radulescu2004 and OCP 5 that you have proposed in your declaration, which parts 6 of OCP would be substituted into Radulescu2004?</p> <p>7 A. For example, it would be the use of the OCP 8 signals that Radulescu2004 already says that can be part 9 of the network interface. So if you used that -- those 10 interface signals or that protocol, then you would have 11 a combination where it includes the address ranges and 12 it would include the ThreadID.</p> <p>13 Q. So in the Radulescu/OCP combination the 14 modification you're proposing is to modify the master 15 module in Radulescu2004 such that it uses OCP; is that 16 right?</p> <p>17 A. It's even simpler than that. It follows 18 Radulescu's teaching and use an adapter as shown that is 19 an OCP adapter. And that would give you a signal of 20 that ID and the address ranges.</p> <p>21 Q. So, in the Radulescu/OCP combination, you're 22 not substituting any physical components from OCP into 23 Radulescu2004, correct?</p> <p>24 A. I -- I am not. I'm following Radulescu's 25 teaching -- Radulescu2004's teaching that says one of</p>

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1 the interface's protocols could be OCP. So I looked up
 2 OCP, what signals does OCP provide, and that's the
 3 combination. If I listened to Radulescu2004 or one of
 4 ordinary skill in the art just listens to it, they would
 5 have the address ranges and the ThreadIDs.
 6 MR. CHRISTOPHER: All right. I have added the
 7 previously marked Exhibit 1021 to the chat.
 8 (Exhibit 1021 was previously marked
 9 for identification by the Certified
 10 Shorthand Reporter.)
 11 BY MR. CHRISTOPHER:
 12 Q. Will you please open that up and let me know
 13 when you have it available.
 14 A. I have it.
 15 Q. All right. Do you recognize Exhibit 1021?
 16 A. I don't. Not offhand, no.
 17 Q. Let's go back to your declaration, "Materials
 18 Considered" section. I'll give you the page once I find
 19 it. If you would go to page 9 -- or, sorry, 12 of the
 20 PDF of your declaration which is part of paragraph 27.
 21 A. I'm there.
 22 Q. Do you see at the top Exhibit 1021 is listed
 23 in your list of materials considered?
 24 A. I do.
 25 Q. So 1021 is something you considered when you

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1 formed your opinions?
 2 A. I did.
 3 Q. And I want to go back to 1021 and direct you
 4 to Table 3 on page 8.
 5 A. Yes.
 6 Q. All right. Did you review Table 3 in
 7 Exhibit 1021 when you prepared your declaration?
 8 A. I'm sure I did. I don't recall.
 9 Q. Table 3 is listing pros and cons for buses and
 10 networks for systems on a chip, correct?
 11 A. Yes.
 12 Q. Okay. On the right we have network pros and
 13 cons, right?
 14 A. Yes.
 15 Q. And fourth from the bottom there's a minus
 16 sign and it says:
 17 "Internal network contention
 18 causes a small latency."
 19 Do you see that?
 20 A. Yes.
 21 Q. And then on the left-hand side right across
 22 there's a plus sign and it says:
 23 "Bus latency is zero once arbiter
 24 has granted control."
 25 Do you see that?

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1 A. Yes.
 2 Q. So if a bus -- strike that.
 3 One of the cons to using a network relative to
 4 a bus is that it causes a small latency, correct?
 5 A. That's what this paper is saying.
 6 Q. Okay. The next line down on the right there's
 7 a minus sign and it says:
 8 "The network has a significant
 9 silicon area."
 10 Do you see that?
 11 A. Yes.
 12 Q. And silicon area is referring to the physical
 13 space that the network takes up on the chip, correct?
 14 A. Yes.
 15 Q. And then on the left right across there's a
 16 plus and it says:
 17 "The silicon cost of a bus is
 18 near zero."
 19 Do you see that?
 20 A. Yes.
 21 Q. So one of the cons to using the network is
 22 that it has a significant silicon area; it takes up more
 23 room than a bus, correct?
 24 A. Yes. That's an extreme generalization that is
 25 very dependent on your application and dependent on your

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1 implementation. So I would have to read this a little
 2 more carefully to see what they're referring to but this
 3 is -- this is an extreme generalization of the pluses
 4 and minuses.
 5 Q. Okay. And then the last line on "Network Pros
 6 and Cons" there's a minus sign again and it says:
 7 "System designers need
 8 reeducation for new concepts."
 9 Do you see that?
 10 A. I do.
 11 Q. And then on the left there's a plus sign that
 12 says:
 13 [As read.]
 14 "The concepts are simple and well
 15 understood" for buses.
 16 Right?
 17 A. I see that.
 18 Q. And this is saying that networks are more
 19 complicated than buses, correct?
 20 A. It's -- it's -- it's saying they're -- they're
 21 a new concept but a person of ordinary skill in the art
 22 that I've defined in the level of ordinary skill in the
 23 art includes knowledge of system concepts and NoC
 24 experience, so they already know these concepts.
 25 Q. Would you agree that a network on a chip is

<p style="text-align: right;">Page 137</p> <p>1 more expensive than a bus?</p> <p>2 A. Not generally. It depends, again, on the</p> <p>3 implementation and it depends on the ultimate outcome.</p> <p>4 Q. So let's use some specific examples. The</p> <p>5 network in Radulescu2004 would be more expensive to</p> <p>6 implement than the shared bus in Weber, correct?</p> <p>7 A. I couldn't possibly say that without looking</p> <p>8 at the exact architecture, how the systems were</p> <p>9 implemented, and then I can give you an assessment of</p> <p>10 the expense.</p> <p>11 Q. So based on the four corners of Weber and</p> <p>12 Radulescu, you don't have an opinion on which design</p> <p>13 would be more costly to implement; is that right?</p> <p>14 A. I missed the last part of your sentence. More</p> <p>15 what?</p> <p>16 Q. More costly to implement.</p> <p>17 A. No. Not without getting more details.</p> <p>18 Q. Would you agree that a network on a chip is</p> <p>19 more complex than using a single shared bus?</p> <p>20 A. What do you mean by "complex"?</p> <p>21 Q. In terms of the number of components required.</p> <p>22 Start with that.</p> <p>23 A. Perhaps you'll need a couple of network nodes.</p> <p>24 So you might need additional network nodes in there but</p> <p>25 your savings might be, you know -- again, that's why I</p>	<p style="text-align: right;">Page 139</p> <p>1 A. Synthesis tool, tools for example. There are</p> <p>2 vendors that provide you with -- for network-on-chips</p> <p>3 they provide you not only the -- the -- the software</p> <p>4 tools in order to implement it, but they'll even give</p> <p>5 you -- you know, you can buy the blocks from them. You</p> <p>6 can license the block from them to put it down.</p> <p>7 So again, you're asking questions in the</p> <p>8 abstract that have so many dependencies or depending --</p> <p>9 is dependent upon how a person of ordinary skill in the</p> <p>10 art would implement these systems.</p> <p>11 Q. The software that you were just referring to</p> <p>12 for designing a network on a chip, is there similar</p> <p>13 software for designing a shared bus on a system on a</p> <p>14 chip?</p> <p>15 A. I would presume yes. I don't recall seeing</p> <p>16 one but I wouldn't -- I wouldn't discount that there is</p> <p>17 one.</p> <p>18 MR. CHRISTOPHER: Let's go off the record.</p> <p>19 COURT REPORTER: Off the record at 3:55 p.m.</p> <p>20 (Recess was taken from 3:55 p.m.</p> <p>21 to 4:09 p.m.)</p> <p>22 COURT REPORTER: Back on the record at</p> <p>23 4:09 p.m.</p> <p>24 BY MR. CHRISTOPHER:</p> <p>25 Q. Dr. Hassoun, did you discuss your testimony</p>
<p style="text-align: right;">Page 138</p> <p>1 keep saying you have to look at the system. But your</p> <p>2 savings on the -- if you're comparing it to a single</p> <p>3 shared bus, you're savings on that might be less wires</p> <p>4 that you have to deal with on a longer distance. That's</p> <p>5 why it's -- your questions are all subjective, depending</p> <p>6 on the implementation.</p> <p>7 Q. But in terms of -- let's use Weber and</p> <p>8 Radulescu2004 as examples. Radulescu2004's network has</p> <p>9 more components than Weber's shared buses, right?</p> <p>10 A. No.</p> <p>11 Q. Sorry. Did you say no?</p> <p>12 A. I did say no.</p> <p>13 Q. So your view is that Weber's series of shared</p> <p>14 buses are more complicated than Radulescu2004's network?</p> <p>15 A. That's not what I said. That wasn't the</p> <p>16 question.</p> <p>17 The question was number of components. And my</p> <p>18 answer is no. That's not what the disclosure is.</p> <p>19 Q. What about in terms of the time to design the</p> <p>20 network versus a shared bus, would you agree that it is</p> <p>21 more complicated, the design and network on a chip than</p> <p>22 using a shared bus?</p> <p>23 A. No. It depends on what tools I have available</p> <p>24 to me.</p> <p>25 Q. What kind of tools are you referring to?</p>	<p style="text-align: right;">Page 140</p> <p>1 with anyone during our break?</p> <p>2 A. No.</p> <p>3 Q. Okay. I promise we're near the end. If you</p> <p>4 would pull up Radulescu2004, Exhibit 1005, one more time</p> <p>5 for me.</p> <p>6 A. Okay. I'm there.</p> <p>7 Q. I want to go back to the paragraph that's one,</p> <p>8 two, three, four down that starts with "We implement."</p> <p>9 Do you see that paragraph?</p> <p>10 A. I'm sorry, which page?</p> <p>11 MR. VANDENBURGH: Section 4.2, page 4?</p> <p>12 MR. CHRISTOPHER: Yes, 4.2, page 4.</p> <p>13 A. Okay.</p> <p>14 BY MR. CHRISTOPHER:</p> <p>15 Q. All right. The very last sentence in that</p> <p>16 paragraph reads:</p> <p>17 "In-order delivery per slave of</p> <p>18 request messages is already provided</p> <p>19 by the point-to-point connections."</p> <p>20 Do you see that?</p> <p>21 A. Yes.</p> <p>22 Q. So Radulescu2004 provides in-order delivery</p> <p>23 for request messages, correct?</p> <p>24 A. For slave, yes.</p> <p>25 ///</p>

<p style="text-align: right;">Page 141</p> <p>1 MR. CHRISTOPHER: All right. I lost my last 2 packet. I need to check real quick. 3 All right. Thank you for your time today, 4 Dr. Hassoun. I appreciate it. 5 No further questions from patent owner. 6 MR. VANDENBURGH: All right. Let's take about 7 a 15-minute break and we will come back if we have any 8 questions. 9 COURT REPORTER: Off the record at 4:11 p.m. 10 (Recess was taken from 4:11 p.m. 11 to 4:50 p.m.) 12 COURT REPORTER: Back on the record at 13 4:50 p.m. 14 EXAMINATION 15 BY MR. VANDENBURGH: 16 Q. Two things, Dr. Hassoun. First, you testified 17 earlier that Weber does not talk about packets, right? 18 A. Yes. 19 Q. Does Weber contain any language that suggests 20 the use of packets? 21 A. Yes. 22 Q. Can you elaborate on that? 23 A. So I would like to refer to my declaration. 24 Weber talks about multiplexing addresses and data. That 25 would suggest to one of skill in the art that that is</p>	<p style="text-align: right;">Page 143</p> <p>1 Your answer, "Yes." 2 Next question: 3 "In such an embodiment you would 4 need to perform that conversion 5 described in the specification in 6 order to perform the mapping step in 7 the claims." 8 And your answer was: 9 "I've answered that question, 10 yes, you need to do it at at least 11 one end." 12 Can you clarify what you meant there? 13 A. Yes. What I answered when I answered that 14 question, I was referring when I said "yes" to the 15 specification embodiment part of that question where 16 there was two different protocols on one end and the 17 other, and that was a "yes" to do a conversion. 18 But I just want to clarify, the claim itself, 19 the mapping step in the claim, does not require any 20 conversion. It's the system example that we were 21 talking about that would require such a conversion. 22 MR. VANDENBURGH: I have no further questions. 23 MR. CHRISTOPHER: I will have recross. Can we 24 go off for five minutes? 25 MR. VANDENBURGH: Sure.</p>
<p style="text-align: right;">Page 142</p> <p>1 the concept of packets. So if we go to paragraph 225, 2 which is the bottom of page 155 of my report, bottom 3 left page 155, and it reads: 4 "Weber discloses that the 5 address, data and control signals 6 can be multiplexed over common wires 7 on the shared communication buses 8 112, 114." 9 Quote: 10 [As read.] 11 "Alternative embodiments include 12 a pipeline communication bus with 13 multiplexed address, data and 14 control signals." 15 So that suggests to a POSA the use of packets. 16 Q. Then, secondly, I'm just going to read some 17 testimony from the real time. I'm going to ask -- read 18 two questions and answers from, I believe, before our 19 lunch. You were asked: 20 "Earlier we talked about an 21 example where the master module uses 22 a protocol and the second module, a 23 slave module uses a second 24 protocol." 25 Do you recall that?</p>	<p style="text-align: right;">Page 144</p> <p>1 COURT REPORTER: Off the record at 4:54 p.m. 2 (Recess was taken from 4:54 p.m. 3 to 5:10 p.m.) 4 COURT REPORTER: Back on the record at 5 5:10 p.m. 6 MR. CHRISTOPHER: First, I want to make a note 7 for the record that we were off the record for 8 approximately 38 minutes between the end of 9 cross-examination and redirect. 10 FURTHER EXAMINATION 11 BY MR. CHRISTOPHER: 12 Q. Dr. Hassoun -- 13 MR. VANDENBURGH: The record will speak for 14 itself but I do not believe that is true. 15 MR. CHRISTOPHER: That's what I have on the 16 time. 17 BY MR. CHRISTOPHER: 18 Q. Dr. Hassoun, did you discuss your testimony in 19 response to my questioning during the break between 20 cross-examination and redirect? 21 A. Yes. 22 Q. Did you discuss the questions that counsel 23 would ask you during redirect during the break? 24 A. Yes. 25 Q. Did you discuss the answers that you would</p>

<p style="text-align: right;">Page 145</p> <p>1 give to counsel in response to that questioning during</p> <p>2 the break?</p> <p>3 A. Yes.</p> <p>4 Q. Did you review the real-time transcript of the</p> <p>5 deposition during the break between cross-examination</p> <p>6 and redirect?</p> <p>7 A. Yes. Let me back that up, it was read to me.</p> <p>8 Q. Okay. So with respect to whether Weber</p> <p>9 discloses packets, you would still agree, wouldn't you,</p> <p>10 that Weber does not expressly disclose packets, correct?</p> <p>11 A. Yes, it doesn't use the word "packet" in</p> <p>12 there.</p> <p>13 Q. Okay. And let's turn to paragraph 225 of your</p> <p>14 declaration, please.</p> <p>15 A. Okay.</p> <p>16 Q. Okay. During redirect you testified that you</p> <p>17 stated in paragraph 225 that Weber suggests packets,</p> <p>18 correct?</p> <p>19 A. Yes.</p> <p>20 Q. The word "packet" doesn't appear anywhere in</p> <p>21 paragraph 225, does it?</p> <p>22 A. The word "packet" does not, no.</p> <p>23 Q. And you don't say anywhere in paragraph 225</p> <p>24 that Weber suggests packets, do you?</p> <p>25 A. The claims do not require packets, so no, I</p>	<p style="text-align: right;">Page 147</p> <p>1 a pipelined communications bus with</p> <p>2 multiplexed address, data and</p> <p>3 control signals."</p> <p>4 Do you see that?</p> <p>5 A. I do.</p> <p>6 Q. So there's two embodiments described here in</p> <p>7 the first two sentences of paragraph 36, correct?</p> <p>8 A. That is correct.</p> <p>9 Q. And then in the very last sentence of</p> <p>10 paragraph 36 it reads "The latter embodiment."</p> <p>11 Do you see that?</p> <p>12 A. Yes.</p> <p>13 Q. And that's referring to the second multiplexed</p> <p>14 embodiment, correct?</p> <p>15 A. Correct.</p> <p>16 Q. And it says there in the last sentence:</p> <p>17 "The latter embodiment may be</p> <p>18 more appropriate for chip-to-chip</p> <p>19 communications between semiconductor</p> <p>20 devices because package pins and</p> <p>21 board traces increase the per signal</p> <p>22 cost, while total required</p> <p>23 communications performance is</p> <p>24 usually lower."</p> <p>25 Do you see that?</p>
<p style="text-align: right;">Page 146</p> <p>1 did not say that in 225.</p> <p>2 Q. So when you testified on redirect that Weber</p> <p>3 suggests packets, you were offering that opinion for the</p> <p>4 first time during the deposition after conferring with</p> <p>5 counsel, correct?</p> <p>6 A. I -- that it suggests packets, yes. But the</p> <p>7 fact that it provides for an alternate embodiment,</p> <p>8 including a pipeline communication bus where it</p> <p>9 multiplexes address, data and control signals, that I</p> <p>10 already opined on.</p> <p>11 Q. But with respect to whether Weber suggests</p> <p>12 packets, that's not in your declaration, is it?</p> <p>13 A. It is not.</p> <p>14 Q. Okay. Can you turn to paragraph 36 of Weber.</p> <p>15 Let me know when you're there.</p> <p>16 A. I'm there.</p> <p>17 Q. So at the beginning of paragraph 6 it reads:</p> <p>18 "In one embodiment, the present</p> <p>19 invention is a pipelined</p> <p>20 communications bus with separate</p> <p>21 command, address and data wires."</p> <p>22 Do you see that?</p> <p>23 A. Yes.</p> <p>24 Q. And then in the next sentence it says:</p> <p>25 "Alternative embodiments include</p>	<p style="text-align: right;">Page 148</p> <p>1 A. Yes.</p> <p>2 Q. And here Weber is suggesting that the</p> <p>3 multiplex embodiment would be more appropriate for</p> <p>4 chip-to-chip communications, correct?</p> <p>5 MR. VANDENBURGH: Objection, form.</p> <p>6 A. It says may be more appropriate. So, again,</p> <p>7 just with many of the general disclosures, it's really</p> <p>8 up to a person of ordinary skill in the art to make that</p> <p>9 decision based on their system requirements and their</p> <p>10 system needs.</p> <p>11 BY MR. CHRISTOPHER:</p> <p>12 Q. And you didn't offer any opinions in your</p> <p>13 declaration with respect to whether the latter</p> <p>14 embodiment in Weber would be appropriate for on-chip</p> <p>15 communications, correct?</p> <p>16 A. I did if you read -- if you continue with --</p> <p>17 on page -- paragraph 225 of my report. On page 156,</p> <p>18 bottom left 156, the second sentence down I say:</p> <p>19 "By suggesting that multiplexing</p> <p>20 may be more appropriate for</p> <p>21 interchip buses as opposed to</p> <p>22 intrachip buses, Weber indicates</p> <p>23 that multiplexing can be used on</p> <p>24 both interchip and intrachip buses."</p> <p>25 Q. But you don't specifically opine on why</p>

<p style="text-align: right;">Page 149</p> <p>1 multiplexing would be appropriate for intrachip buses, 2 correct? 3 A. Because Weber says it may be appropriate, so 4 Weber is suggesting it being used on both. But it might 5 be more appropriate for one than the other. 6 Q. So during redirect you were asked a question 7 about your earlier testimony regarding the mapping step 8 in the '052 patent. Do you recall that? 9 A. Yes. 10 Q. And you clarified your earlier testimony, 11 right? 12 A. Yes. 13 Q. Did counsel ask you to clarify that testimony? 14 A. No. 15 Q. So you independently identified that portion 16 of your testimony as something you wanted to clarify? 17 A. No. As I said, they read that testimony to 18 me, and asked me is this what I meant to say. And when 19 I looked at it and I noticed the tail end of that 20 question discussed the claimed mapping, that's when I 21 wanted to clarify it. 22 Q. So the testimony was called to your attention 23 by counsel, correct? 24 A. That is correct. 25 Q. Okay. What other portions of your testimony</p>	<p style="text-align: right;">Page 151</p> <p>1 COURT REPORTER: Would you like a rough draft? 2 It does cost extra. 3 MR. VANDENBURGH: No. 4 (Deposition concludes at 5:28 p.m. (EST).) 5 *** 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25</p>
<p style="text-align: right;">Page 150</p> <p>1 did counsel show you? 2 A. They didn't show me any portions, they read me 3 the portions related to both questions we talked about. 4 Q. Did counsel read you any portions of your 5 testimony regarding any other subjects other than the 6 two questions you were asked on redirect? 7 A. They did not. 8 MR. CHRISTOPHER: If we can go off the record 9 for two minutes and you'll indulge me, I'll confer with 10 my colleague and see if we can wrap up. 11 MR. VANDENBURGH: Okay. 12 COURT REPORTER: Off the record at 5:20 p.m. 13 (Recess was taken from 5:20 p.m. 14 to 5:27 p.m.) 15 COURT REPORTER: Back on the record at 16 5:27 p.m. 17 MR. CHRISTOPHER: No further questions from 18 patent owner. Thanks everyone. 19 MR. VANDENBURGH: Nothing from us either. 20 Thank you. 21 COURT REPORTER: Mr. Vandenburg, would you 22 like to purchase a copy? 23 MR. VANDENBURGH: Yes, I want a copy at just 24 regular pace is fine. We don't have a rush. The 25 witness would like to review and sign.</p>	<p style="text-align: right;">Page 152</p> <p>1 STATE OF CALIFORNIA) 2) 3 COUNTY OF SAN DIEGO) 4 5 I, Linda E. Marquette, a Certified Shorthand 6 Reporter, do hereby certify: 7 That prior to being examined, the witness in the 8 foregoing proceedings was by me duly sworn remotely to 9 testify to the truth, the whole truth, and nothing but 10 the truth; 11 That said proceedings were taken remotely before me 12 at the time and place therein set forth and were taken 13 down by me in shorthand and thereafter transcribed into 14 typewriting under my direction and supervision; 15 I further certify that I am neither counsel for, 16 nor related to, any party to said proceedings, nor in 17 anyway interested in the outcome thereof. 18 In witness whereof, I have hereunto subscribed my 19 name. 20 21 Dated: 09/22/2024 22  23 Linda E. Marquette, RPR, CLR, 24 CA CSR No. 11874; UT No. 13725361-7801 25</p>

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1 DECLARATION UNDER PENALTY OF PERJURY

2 Case Name: Qualcomm vs. Network System Technologies

3 Date of Deposition: 09/11/2024

4 Job No.: 10147601

5

6 I, MARWAN HASSOUN, Ph.D., MS, hereby certify

7 under penalty of perjury under the laws of the State of

8 _____ that the foregoing is true and correct.

9 Executed this _____ day of

10 _____, 2024, at _____.

11

12

13 _____

14 MARWAN HASSOUN, PH.D., MS

15

16 NOTARIZATION (If Required)

17 State of _____

18 County of _____

19 Subscribed and sworn to (or affirmed) before me on

20 this _____ day of _____, 20____,

21 by _____, proved to me on the

22 basis of satisfactory evidence to be the person

23 who appeared before me.

24 Signature: _____ (Seal)

25

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1 DEPOSITION ERRATA SHEET

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22 _____ Subject to the above changes, I certify that the

transcript is true and correct

23 _____ No changes have been made. I certify that the

transcript is true and correct.

24

25 _____

MARWAN HASSOUN, PH.D., MS

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1 DEPOSITION ERRATA SHEET

2 Case Name: Qualcomm vs. Network System Technologies

Name of Witness: Marwan Hassoun, Ph.D., MS

3 Date of Deposition: 09/11/2024

Job No.: 10147601

4 Reason Codes: 1. To clarify the record.

2. To conform to the facts.

5 3. To correct transcription errors.

6 Page _____ Line _____ Reason _____

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