

IN THE UNITED STATES DISTRICT COURT

FOR THE DISTRICT OF DELAWARE

TQ DELTA LLC,)
)
Plaintiff,) C.A. No. 13-1835-RGA
)
v.)
)
2WIRE, INC.,)
)
Defendant.)

J. Caleb Boggs Courthouse
844 North King Street
Wilmington, Delaware

Wednesday, May 22, 2019
8:30 a.m.
Trial Volume III

BEFORE: THE HONORABLE RICHARD G. ANDREWS, U.S.D.C.J.

APPEARANCES:

FARNAN LLP
BY: MICHAEL J. FARNAN, ESQUIRE

-and-

MCANDREWS HELD & MALLOY, LTD
BY: PETER J. MCANDREWS, ESQUIRE
BY: PAUL W. MCANDREWS, ESQUIRE
BY: JAMES MURPHY, ESQUIRE
BY: THOMAS WIMBISCUS, ESQUIRE

-and-

ROBINS KAPLAN LLP
BY: DAVID A. PRANGE, ESQUIRE
BY: BENJAMIN C. LINDEN, ESQUIRE

For the Plaintiff

MR. MCANDREWS: Ms. Targowska is going to handle

the first one here.

THE COURT: Good morning, Ms. Targowska. Come forward.

MS. TARGOWSKA: Permission to approach, Your Honor?

THE COURT: Sure.

MS. TARGOWSKA: The issue is with the

demonstratives for Dr. Jacobsen's direct examination. TQ Delta is objecting to slides 34 through 58 as an undisclosed expert opinion, and also as prejudicial under 403.

The reason is that every slide within that range states that the LB031 reference discloses the element of the claim.

THE COURT: All right. So I tend to agree with you. You don't have to say anything more than Dr. Yu -- oh, wait. This is Ms. Jacobsen. Sorry. Oh, sorry. I misunderstood what we were doing here.

What is the problem here?

MR. TARGOWSKA: Dr. Jacobsen in her slides asserts that every medical element of the claim is disclosed by a single reference. Anticipation has never been raised in this case, Your Honor, and there is a difference between saying that a person of ordinary skill would understand something from a disclosure and saying that there's a

APPEARANCES CONTINUED:

MORGAN LEWIS
BY: JODY C. BARILLARE, ESQUIRE

-and-

GOODWIN PROCTER, LLP
BY: BRETT SCHUMAN, ESQUIRE
BY: RACHEL WALSH, ESQUIRE
BY: DOUGLAS KLINE, ESQUIRE
BY: ANDREW ONG, ESQUIRE
BY: CINDY CHANG, ESQUIRE

For the Defendant

*** PROCEEDINGS ***

DEPUTY CLERK: All rise.

THE COURT: All right. Good morning, everyone.

Please be seated.

All right. So one administrative matter. I believe the courtroom deputy has passed out the time that's been allotted or that each side has used. But if it's the case that some of the depositions that were played yesterday, that the time is supposed to be shared, we haven't been given that information. So if there needs to be a different allocation of that, you need to get us that information.

So in terms of any issues that I can help you with or at least resolve this morning?

MR. MCANDREWS: Yes, Your Honor. We have a few issues about slides.

THE COURT: Okay.

combination of a reference with the knowledge of a person of ordinary skill in the art.

THE COURT: Okay. So I think I understand what you're saying which is you can't say it anticipates, call that obviousness, and let the jury go from there. Is that what you're saying?

MS. TARGOWSKA: Exactly, Your Honor. It's --

THE COURT: Okay. I've got that point.

What is the response here, Mr. Ong?

MR. ONG: Good morning, Your Honor. So Dr. Jacobsen is not going to testify as to an anticipation opinion.

THE COURT: But she can't testify that it anticipates and say I'm calling it obvious, can she?

MR. ONG: No, she's not going to testify to that effect.

THE COURT: So I guess what would make this easier is -- is it Ms. Targowski?

MS. TARGOWSKA: Targowska.

THE COURT: Okay. Sorry. Ms. Targowska says that these slides go along with Dr. Jacobsen saying every single element is disclosed in one single prior art reference. Which element is not disclosed?

MR. ONG: Which element is not disclosed?

THE COURT: Right. Right. In other words, just

510 1 saying no, she's not going to say it's anticipating. What 2 is it she's going to say is not in -- I think it's Mazzoni 3 MS. TARGOWSKA: LB031. 4 THE COURT: I'm sorry, LB031. Okay. What sort 5 of thing is LB031? Is that a paper or is that -- 6 MS. TARGOWSKA: It's a contribution to a 7 standard. 8 THE COURT: Oh, okay. 9 MS. TARGOWSKA: And Your Honor, what makes it 10 confusing, if I may point out to the summary slide which is 11 slide 58, Dr. Jacobsen has red checkmarks by every element 12 of the claim with respect to LB031, and again calls it 13 obviousness. This is improper. 14 THE COURT: Well, so I thought the -- okay. 15 MR. SCHUMAN: Your Honor, may I be heard 16 briefly? I know Mr. Ong was handling this, but I am going 17 to be putting on Dr. Jacobsen's testimony. This was the 18 subject of a summary judgment motion briefing. And the 19 Court's memorandum opinion, I believe it's dated April 25th, 20 talked about how Dr. Jacobsen has her -- it's essentially a 21 single reference obviousness argument that the Court found. 22 THE COURT: Right. So that means she's putting 23 in knowledge of person of ordinary skill in the art. 24 MR. SCHUMAN: And that's what her testimony is 25 going to be. And then there is also the combination with	512 1 combination, which is LB031 with Mazzoni, Dr. Jacobsen has 2 slides that explicitly provide motivation to combine and put 3 the two references side by side. 4 So what should be done is maybe adding another 5 column for a person of ordinary skill in the art, and 6 knowledge, whatever it may be called in either a summary 7 slide, and also in the titles of the respective -- of the 8 slides that relate to the respective claim elements as goes 9 to shared memory. 10 THE COURT: But in the end your objection is 11 just that there's red -- so I'm going to overrule the 12 objection based on what both parties understand which is 13 that, in fact, her testimony is going to be obviousness. 14 And you know if the -- and so I'm not going to be editing 15 where the checkmarks go. 16 So -- 17 MR. SCHUMAN: Thank you, Your Honor. 18 THE COURT: So I'll overrule that. What else? 19 MS. TARGOWSKA: Your Honor, there's one more 20 objection with respect to Slide 20. 21 THE COURT: Yes. 22 MS. TARGOWSKA: Slide 20 is also an undisclosed 23 expert opinion. 24 THE COURT: Okay. 25 MS. TARGOWSKA: Dr. Jacobsen has not explained
511 1 Mazzoni which was also the subject of the Court's ruling 2 where she's going to talk about how Mazzoni expressly 3 discloses the shared memory. 4 THE COURT: So I guess the question that would 5 make this easy for me, Mr. Schuman, is what is it that 6 Dr. Jacobsen is going to say requires the knowledge of a 7 person of ordinary skill in the art in order to complete an 8 obviousness analysis here? 9 MR. SCHUMAN: So that -- so the word shared 10 memory is not used in LB31. And Dr. Jacobsen, as a person 11 of ordinary skill in the art, just like she did in the 12 summary judgment briefing, is going to testify that it would 13 have been understood to a person of ordinary skill in the 14 art, and LB031 messaging scheme could be used either with 15 discrete memory or shared memory. 16 THE COURT: Okay. So -- 17 MS. TARGOWSKA: Your Honor, may I respond? 18 THE COURT: You may, but that sounds like an 19 answer. 20 MS. TARGOWSKA: The issue is not with what 21 Dr. Jacobsen is going to say. The issue is with the 22 demonstratives that imply that this is an anticipation 23 argument. The jury is not going to make the fine 24 distinction that counsel is pointing to, and especially in 25 the fact -- given the fact that with respect to the other	513 1 why any of those references disclosed shared memory. The 2 only thing she had in her reports was a blanket statement 3 that they do with the string citation putting this up to the 4 demonstrative. 5 THE COURT: So the string citation is to 6 Berkmann and Kang? 7 MS. TARGOWSKA: Yes, Your Honor, and there was 8 no analysis provided for the opinion. 9 THE COURT: Did you have a page of the expert 10 report? 11 MR. SCHUMAN: Your Honor -- go ahead. This was 12 a subject you have motion in limine, there was a motion in 13 limine that said she can mention Berkmann and Kang. 14 THE COURT: I was wondering whether there was 15 the two. 16 MR. SCHUMAN: These are the two references. The 17 Court ruled they are in her expert report. That's not in 18 dispute here. The quotes that appear on the slide are the 19 exact quotes in the expert report. And the briefing in the 20 motion in limine was how much is fair elaboration on 21 references disclosed in the expert report and the Court said 22 I can't know that until I see the testimony. But as far as 23 the slide goes, Your Honor, these references were disclosed 24 and these quotes on the slide were the quotes that were in 25 her expert report.

514 1 MS. TARGOWSKA: Your Honor, our objection to the 2 extent that Dr. Jacobsen says literally anything other than 3 what's on the slide, and also even if she only says that 4 that is a conclusion that is being provided to the jury 5 without a proper expert analysis being disclosed about those 6 references. 7 THE COURT: Okay. I think I -- let me just 8 check my notes here. You know, I have a vague memory that I 9 may or may not have looked at an expert report in connection 10 with this. And I do remember, I remember the ruling, but I 11 don't remember exactly what it was that I looked at. But in 12 the ruling that I see, there is exactly what Mr. Schuman 13 just said I said in terms of the bottom line. So the only 14 thing that might help here is if one of you actually has in 15 hand the page of Dr. Jacobsen's report where we have the 16 citation. 17 MR. SCHUMAN: Just a moment, Your Honor. 18 THE COURT: Sure. 19 MS. TARGOWSKA: Your Honor, permission to 20 approach. 21 THE COURT: Sure. Yes. Do you have a 22 particular page? 23 MR. MCANDREWS: Sorry, Your Honor, that's the 24 second volume. This is actually the one that has it. 25 THE COURT: Okay.	516 1 that's the baseline before we get to the question of 2 elaboration. And as I said before, I will have to decide 3 that, make an objection -- but based on what I have heard so 4 far, I haven't heard anybody -- I think Dr. Cooklev agreed 5 that shared memory was known in the art before. I didn't 6 think this was a disputed point. 7 MS. TARGOWSKA: But these references, Your 8 Honor, were never specifically mentioned or discussed and no 9 expert opinion was provided on those references. 10 THE COURT: No. So we're beyond that because 11 they are mentioned here for -- you know, she's got her point 12 and then she's got citations that say the same thing. So 13 I'm going to overrule this objection. And I will also give 14 you back your volume. Is there anything else the plaintiff 15 wants to raise? 16 MS. TARGOWSKA: Yes, Your Honor. My colleagues 17 will. Permission to approach, Your Honor. 18 THE COURT: Yes. 19 MR. ONG: Your Honor, may I approach? 20 THE COURT: Yes. 21 MR. ONG: These are deposition designations, I 22 just have a clip report that defendant wants to play in the 23 rebuttal case, and I think I have highlighted for you, page 24 nine, they have no relevance. 25 THE COURT: What is the relevance?
515 1 MS. TARGOWSKA: I apologize. 2 THE COURT: That's all right. That's all right. 3 Can someone remind me what paragraph? I guess 4 you're looking for it. 5 MR. SCHUMAN: Paragraph 72, Your Honor. 6 THE COURT: And that's in the opening or the 7 reply? 8 MR. SCHUMAN: In the opening expert report on 9 invalidity. 10 MS. TARGOWSKA: And Your Honor -- 11 THE COURT: I'm sorry, what was the paragraph 12 number again, Mr. Schuman? 13 MR. SCHUMAN: Paragraph 72, Your Honor. 14 THE COURT: And Ms. Targowska. 15 MS. TARGOWSKA: This is PTX-168. 16 THE COURT: Thank you. 17 MS. TARGOWSKA: The one thing I would like to 18 add is this is the only place where it appears -- let me 19 take that back. She does not mention any of those 20 references in her reply report at all. 21 THE COURT: Okay. That's all right. Well, so, 22 just looking at the slide and I'm looking at paragraph 72, 23 and as Mr. Schuman said and I don't think Ms. Targowska is 24 actually disputing, the exact quotes are highlighted in 25 yellow here in her report along with the publication. So	517 1 MR. WIMBISCUS: Your Honor, this is one to two 2 minutes of 30(b)(6) deposition testimony of 2Wire's director 3 of finance, Mr. Patel. And essentially if you went to page 4 144, it partly collapses into that designation. 5 THE COURT: I'm sorry, I don't see a page 6 number. 7 MR. ONG: Number 9, Your Honor, page 144. 8 THE COURT: Thank you. 9 MR. WIMBISCUS: Thank you, Your Honor. So there 10 it says that at 2Wire 30(b)(6) witness says he looked at the 11 records and confirmed that 2Wire has not paid any patent 12 royalties on any DSL products since at least 2010. 13 THE COURT: What is the relevance of that? 14 MR. WIMBISCUS: Your Honor, this goes to the 15 corporate credibility of 2Wire. 16 THE COURT: No, it doesn't. That's ridiculous. 17 MR. WIMBISCUS: We're suggesting that Mr. Miller 18 was on the stand yesterday proclaiming that they didn't have 19 any knowledge of the patent, implying that they're a good 20 corporate citizen and would not have infringed. 21 THE COURT: Saying you didn't pay anyone else a 22 royalty either does not say they are a bad corporate 23 citizen. It's irrelevant. I'm going to sustain the 24 objection. 25 MR. WIMBISCUS: Thank you, Your Honor.

518 1 MR. ONG: Thank you, Your Honor. 2 Your Honor, one more issue with a demonstrative. 3 May I approach? 4 THE COURT: Sure. And these are demonstratives 5 of what? 6 MR. ONG: These are rebuttal slides of 7 Dr. Cooklev on invalidity. Just a few, look at page, slide 8 14. 9 THE COURT: I'm sorry, 14? 10 MR. ONG: That's correct, Your Honor. 11 THE COURT: Yes. 12 MR. ONG: This is just a citation to 13 Dr. Jacobsen's deposition testimony. This is not disclosed 14 anywhere. Obviously it couldn't have been disclosed 15 anywhere in Dr. Cooklev's reports because the deposition 16 happened after. And we think that if plaintiff wants to 17 cross-examine Dr. Jacobsen on this stuff, they can, but it's 18 not something that he relied upon in performing his expert 19 opinions. 20 THE COURT: All right. I understand what you 21 said. 22 Mr. McAndrews. 23 MR. MCANDREWS: Well, Your Honor, it's certainly 24 confirms for you the opinions that Dr. Cooklev provided, and 25 I think it's fair --	520 1 THE COURT: Okay. Well, let me -- is this an 2 extra copy I can keep and Mr. Ong as we break for lunch, 3 remind me about this. 4 MR. ONG: I will Your Honor. We have two more 5 slides. 6 THE COURT: Okay. 7 MR. ONG: Slides 16 and 17, they are in the same 8 pack. So we believe that these are undisclosed expert 9 opinions. So certainly in the slide before on slide 15 it 10 talks about LB-031 does not disclose shared memory. We have 11 no dispute, we're fine with him opining on those opinions, 12 but these opinions relate to the messaging, LB-031 13 messaging. Dr. Cooklev has no opinion as to LB-031 that 14 does not disclose the transmitting or receiving a message 15 limitation. 16 We've asked plaintiff various times for where he 17 discloses this anywhere in his expert reports, and we 18 haven't gotten an answer. 19 THE COURT: All right. I partially understand 20 what you just said. No fault of yours if I don't understand 21 you fully. 22 What is the response? 23 MR. MCANDREWS: So what I start with is it's not 24 actually accurate. Dr. Cooklev does disclose an opinion 25 about LB031 messaging and uses nearly the identical example
519 1 THE COURT: So what about the point of why 2 can't -- if it is what you say it is, why wouldn't it be the 3 right thing to do is to first ask Dr. Jacobsen about it, and 4 if she says yep, then there is no issue here. 5 MR. MCANDREWS: There is no issue as we can use 6 the slide? 7 THE COURT: No, there is no issue because it's 8 already resolved. I mean -- so in any event, you know, 9 Dr. Jacobsen admits the LB-031 does not use shared memory 10 which Mr. Schuman just said was missing, so I suspect -- I 11 suspect from what I just heard she's going to say this on 12 direct examination. So if she says it, yeah, I would 13 probably let you use it, but why don't we at least first off 14 see what is necessary to rebut. 15 But the fact, the fact that it is something that 16 happened after the last expert report, I'm not going to 17 exclude it just for that reason given that it may not be a 18 disputed fact. But we'll see. And Mr. Ong, if you could, 19 because I suppose it's possible that we could be getting to 20 Dr. Cooklev before the end of the day. 21 MR. MCANDREWS: That's what we expect, yes. 22 THE COURT: Okay. And do we think Dr. Jacobsen 23 this morning or is she this afternoon? 24 MR. SCHUMAN: I think that will be this morning, 25 Your Honor.	521 1 described on the slide. And it's -- 2 THE COURT: So can I see it? 3 MR. MCANDREWS: Yes, Your Honor. So the -- 4 THE COURT: Well, so and I was going to say did 5 you -- when you all met and discussed this, because Mr. Ong 6 said you wouldn't tell him where the support was, at least 7 that's what I thought he said. 8 Did you show him this? 9 MR. MCANDREWS: We did cite to that, Your Honor. 10 MR. ONG: I have not heard. I have not been 11 provided -- 12 THE COURT: Well, sometimes in trial, sometimes 13 communication gets mixed up. So Mr. Ong, he's handed me 14 Paragraph 179 of Dr. Cooklev's rebuttal expert report 15 regarding the validity of Family III patents. Is that the 16 paragraph you want me to look at? 17 MR. MCANDREWS: Yes, Your Honor. It's the 18 paragraphs that now include the red and blue boxes there 19 which correspond to the orange and blue boxes on the slide. 20 And let me just clarify. I don't want there to be any 21 misdirection here. That is in his -- a section that 22 addresses LBO31 in his expert report. That detailed 23 discussion of LB031 messaging scheme actually comes in a 24 subsection that is addressing the '473 patent, but it is the 25 exact same argument applied to all of the claims.

522 1 THE COURT: Okay. I forget. Was the '473 2 patent, the one that we're not trying? 3 MR. MCANDREWS: That's the one that's out. Can 4 I just mention one more thing, Your Honor? 5 THE COURT: Sure. 6 MR. MCANDREWS: That is in your summary judgment 7 ruling denying our motion for summary judgment of no 8 invalidity. This is your quote, "Plaintiff argues that 9 LB031 is incompatible with shared memory and that such 10 combination would be inoperable arguably defeating 11 defendant's motivation to combine." 12 You said there's a question of fact, and that is 13 exactly the question of fact raised by these slides. 14 THE COURT: Okay. Hold on just a second. So 15 basically I see red and blue boxes going through to 16 paragraphs 184. So we're starting at -- it starts at 177 17 and then it goes on, but the main thing seems to be on 18 Page 57. Hold on a minute. 19 Well, so Mr. Ong, it looks pretty close to the 20 slide. 21 MR. ONG: Your Honor, I think a couple points 22 here. As Mr. McAndrews mentioned, this is not an opinion 23 disclosed for any of the patents in the suit that are still 24 here. This is for the '473 -- Claim 19 of the '473 patent. 25 So it's not something that we would have addressed. And	524 1 this, and that's exactly what he's doing there. 2 THE COURT: Okay. Well, I think it's disclosed. 3 As I understand it, a lot of what you say about one patent 4 applies to other patents. And after all, we only got rid of 5 the '473 patent like two weeks ago or whenever it was. 6 So I'm going to overrule defendant's objection 7 and -- because I think this is disclosed. I think it was 8 disclosed in a way that is not unfair to allow plaintiff to 9 use it here. 10 All right. What else do we have? 11 MR. ONG: Nothing further, Your Honor. 12 THE COURT: Do you have anything more, 13 Mr. McAndrews? 14 MR. MCANDREWS: No, Your Honor. 15 THE COURT: Okay. Well, we'll take like a 16 two-minute break, and then we'll come back. 17 And Mr. Ong, don't forget to remind me at the 18 lunch break. And can I give this expert report back to 19 somebody? 20 All right. We'll be in recess for a minute or 21 two. 22 DEPUTY CLERK: All rise. 23 (Recess was taken.) 24 THE COURT: All right. We're ready to begin. 25 Mr. Miller, if you're here, come forward. Take a seat.
523 1 with respect to that particular -- with respect to the 2 remaining patents-in-suit -- 3 THE COURT: So hold that thought. 4 Mr. McAndrews, what's your response to that? 5 MR. MCANDREWS: Your Honor, it's -- so it's -- 6 this is a general characterization of LB031 and how it is 7 incompatible with shared memory. And it's the very same 8 issue that comes up in the '473 patent. 9 So your claim construction for shared memory is 10 that you have a portion of memory that can be used at one 11 time for the interleaver and another time for the 12 deinterleaver. And that's -- 13 THE COURT: So isn't the shared memory in all of 14 these? Why is it only in the '473 patent section; do you 15 know? 16 MR. MCANDREWS: So Your Honor, there's -- not to 17 complicate this, there's a general discussion in the 18 background of Dr. Cooklev's report that addresses dedicated 19 memory and the incompatibility of prior art messaging 20 schemes. So then when we get to the sections that address 21 shared memory, as we go through them, there's a reference 22 backup. But then there's a specific example provided in the 23 subsection that deals with the '473. 24 In any event, their complaint appears to be that 25 Dr. Cooklev has not characterized the LB031 reference in	525 1 MS. WALSH: Your Honor, may I approach? 2 THE COURT: Yes. 3 (Jury entering the courtroom at 9:04 a.m.) 4 THE COURT: Good morning, members of the jury. 5 Welcome back. Everyone, you may be seated. 6 Ms. Walsh, you may continue. 7 BY MS. WALSH: 8 Q. Good morning, Mr. Miller. 9 A. Good morning. 10 Q. Could you please go back to your binder. 11 A. Yes. 12 Q. And flip to the tab marked JTX-13, please. 13 A. Okay. 14 Q. Mr. Miller, do you recognize this document? 15 A. It appears to be a data sheet for the 5268AC. 16 MS. WALSH: And I would like to move for the 17 admission of JTX-13. 18 THE COURT: Admitted without objection. 19 (JTX-13 was admitted into evidence.) 20 BY MS. WALSH: 21 Q. What kind of information does JTX-13 contain about 22 the 5268AC product? 23 A. It shows the key features and benefits of the 24 product. On the next page it shows the main interfaces, 25 physical connections for the product. And the following

526 1 page it shows the technical specifications. 2 Q. And I would like for you to flip to the third page 3 there. There is a section in the left-hand column that says 4 DSL modem. Do you see that? 5 A. Yes. 6 Q. And then in the second line down, underneath the 7 title it refers to VDSL2. What does that refer to, 8 Mr. Miller? 9 A. It means it has a functionality of a modem that can 10 implement a VDSL2 motion to DSLAMs used by phone companies, 11 customers, other customers. 12 Q. Mr. Miller, can you flip to JTX-17, please? 13 A. Okay. 14 Q. What is JTX-17, Mr. Miller? 15 A. This appears to be a data sheet for the iNID product, 16 HomePortal iNID. 17 Q. And what, if any, other names are there for the iNID 18 product? 19 A. My recollection is that that is the i3812. 20 Q. And what kind of information does this data sheet 21 contain about the iNID product? 22 A. Again, it list on the front page key features and 23 benefits. On the next page, there is a slightly different 24 class of product that is mounted outside the home. It 25 actually shows a diagram of how it's physically connected	528 1 A. It appears to be a data sheet. Let me make sure it's 2 a data sheet for the HomePortal 3801HGV. 3 MS. WALSH: I would like to move JTX-14 into 4 evidence. 5 THE COURT: All right. Did you mean to admit 6 JTX-17 a minute ago? 7 MS. WALSH: I believe it's already in evidence. 8 THE COURT: Great. All right. Admitted without 9 objection. 10 (JTX-14 was admitted into evidence.) 11 BY MS. WALSH: 12 Q. Mr. Miller, can you explain to the jury what kind of 13 information this document contains? 14 A. This document has, it list key features and benefits 15 and the main physical interconnections on the outside of the 16 box as well as technical specifications. 17 Q. And again, I would like to point you to the second 18 page of JTX-14. 19 A. Okay. 20 Q. There is a middle column there, and at the top of 21 that middle column it refers to a section on broadband 22 network interfaces. 23 A. Yes. 24 Q. And in the first entry below that reads VDSL-DMT for 25 G.993.2 standard?
527 1 and oriented relative to other things in a typical person's 2 home. And let's see, other than that, it looks like 3 marketing, standard marketing literature and it also has 4 technical specifications. 5 Q. And then, Mr. Miller, can you flip to the third page 6 of that document. 7 A. Yes. 8 Q. And about halfway down there is a section that's 9 called HomePortal iNID Technical Specifications? 10 A. Yes, I see that. 11 Q. And then under that, the first heading is DSL 12 Functionality. Do you see that as well? 13 A. I do. 14 Q. Then there is a statement that says Two VDSL2 15 Interfaces. What does that refer to, Mr. Miller? 16 A. It means that it actually implements -- it's capable 17 of doing connections to -- VDSL2 connections to telephone 18 company equipment, the CO, and in fact this one has two 19 distinct and independent modems, so it's capable of bonding 20 connections that can combine the data from two separate 21 modems into one data stream to give the user more data rate. 22 Q. Mr. Miller, can you turn to JTX-14, please. 23 A. JTX-14. Yes, okay. 24 Q. Mr. Miller, can you explain to the jury what this 25 document is?	529 1 A. Yes, ma'am. 2 Q. What does that refer to, Mr. Miller? 3 A. That means it has an interface that can make a VDSL 4 according to the G.993.2 standard, otherwise normally known 5 as VDSL2. 6 MS. WALSH: Thank you, Mr. Miller. Pass the 7 witness. 8 THE COURT: All right. Any cross? 9 MR. P. MCANDREWS: Yes, Your Honor. 10 CROSS-EXAMINATION 11 BY MR. P. MCANDREWS: 12 Q. Good morning, Mr. Miller. 13 A. Good morning. 14 Q. Very nice to see you again. It's been a few years 15 since we last met in a deposition. I have got some 16 follow-up questions for you this morning. 17 A. Okay. 18 Q. I would like to ask you about your -- the company for 19 whom you're currently doing consulting work. 20 A. Uh-huh. 21 Q. Yesterday I believe you testified that you used to 22 work for 2Wire who became Pace who then became ARRIS? 23 A. That's correct. 24 Q. And now you work as a paid consultant for a company 25 called ComScope; correct?

1 A. Well, to be -- to clarify, I'm actually an employee
2 of Kelly OCG, the outsourcing consulting group. And then
3 Kelly then contracts my services back to ComScope.
4 Originally Kelly set up an agreement with ARRIS in roughly
5 October of 2016, and then ComScope recently acquired ARRIS
6 and basically the terms of that agreement are still in
7 effect as far as I know.

8 Q. Understood. I didn't hear that relationship
9 yesterday.

10 So your testimony is the company for whom you
11 are doing the consulting recently purchased the defendant,
12 2Wire, in this case; correct?

13 A. Well, through -- there is an intermediate acquisition
14 of ARRIS -- I'm sorry, of Pace. Pace acquired 2Wire, ARRIS
15 acquired Pace, and now ComScope acquired ARRIS.

16 Q. Thank you for that clarification.

17 Now I would like to ask you a few questions
18 about 2Wire's relationship with Broadcom.

19 A. Okay.

20 Q. You testified yesterday that 2Wire sold its DSL chip
21 division to Broadcom in 2009; correct?

22 A. More or less. I don't think 2Wire had a separate
23 chip division. My testimony if it wasn't before should have
24 been that they sold all IP relative to DSL. And there may
25 have been other terms of the agreement, other IP associated

1 with the agreement I'm not completely clear about, but I
2 know in part they sold all the DSL intellectual property.

3 Q. I think I heard you testify that 2Wire no longer does
4 its own design work related to DSL functionality. Is that
5 what you said yesterday?

6 A. Well, we don't design our own chips.

7 Q. Okay. Thank you.

8 I don't think what you're saying is that 2Wire
9 stopped making and selling millions of DSL modems, though,
10 did you say that?

11 A. I -- if I did say that, that would have been a
12 mistake, and I don't mean to represent that now.

13 Q. Okay. Thank you.

14 Mr. Miller, you also testified about a document
15 that a lot of people have heard about now called the
16 so-called Uber matrix; right?

17 A. That's correct.

18 Q. Okay. And the Uber matrix is an enormous spreadsheet
19 that sets forth AT&T's requirements for 2Wire's products;
20 right?

21 A. Yes.

22 Q. And it also sets forth 2Wire's representation about
23 whether those products meet certain requirements; correct?

24 A. That's correct.

25 Q. Okay. And AT&T is 2Wire's biggest customer for DSL

1 modems; is that also correct?

2 A. I believe that's correct.

3 Q. In fact, the Uber matrix takes the place of both a
4 traditional request for proposal from AT&T; right?

5 A. I'm not absolutely sure about that.

6 Q. Okay. Mr. Miller, do you remember -- I think we
7 already discussed it. I deposed you back in June of 2015;
8 correct?

9 A. I do remember that. Yes.

10 Q. Okay. And do you recall at that time you were under
11 oath certainly in your deposition?

12 A. Mm-hmm. I do recall that. Yes.

13 Q. Yes? Thank you.

14 And during that deposition, the testimony was as
15 follows at Page 24, Lines 2 through 8: Okay. Is it --
16 based on your understanding, is -- does this Uber matrix
17 take the place of a standard request for proposal and
18 response to a request for a proposal?

19 "Answer: Yes."

20 Did you say those things during your June of
21 2015 deposition?

22 A. If it's in the currently recorded deposition, then --
23 then I would accept that I would have said that. Is there a
24 document, or do we have the deposition here for that line to
25 refer to?

1 Q. Would you like to see the testimony up on the screen,
2 Mr. Miller?

3 A. Yeah. Sure.

4 Q. Certainly. The first deposition?

5 A. Yeah, that would be great. Thank you. I appreciate
6 it.

7 Okay. Yeah, I -- I agree that I said that.

8 Q. Okay. Thank you, Mr. Miller.

9 A. Mm-hmm.

10 Q. And you know what, would you please pull up JTX 44,
11 please? So I'd like to direct your attention to Exhibit JTX
12 44, first column, CO.

13 So if you pan in there. I'm sorry, CQ. You
14 know what, I was right the first time. I apologize.

15 Column CO. Please move down from the CO down
16 through row, it looked like it was about six or seven.
17 There you go.

18 So column CO sets forth AT&T's requirements in
19 the Uber matrix; correct?

20 A. Yes, it appears. Yes.

21 Q. Okay. And to the left of that up on the screen, you
22 see where it says requirement level?

23 A. Mm-hmm.

24 Q. The R indicates 2Wire's response to AT&T's
25 requirement; correct?

534 1 A. That's not my understanding. 2 Q. Okay. What is your understanding of what the R 3 stands for, Mr. Miller? 4 A. I actually -- 5 Q. You know what, I misspoke. You can answer, but I 6 think I know my mistake on that. 7 A. Okay. I -- I -- I think it's -- it is AT&T's 8 assertion that this is -- that this is a requirement for the 9 product. 10 Q. That's my understanding, too. I apologize. I 11 misspoke there. 12 So the R is AT&T's assertion that it's a 13 requirement versus an optional feature; correct? 14 A. I think so. 15 Q. Okay. Thank you. 16 And if you go up to CQ, Row 2, please. If you 17 could pan in on what's in the Uber matrix. No, I'm sorry. 18 Just row two, the Status Legend there. 19 And you see the Status Legend? 20 A. I do. 21 Q. And this is a description of various responses from 22 2Wire to AT&T's requirements; correct? 23 A. Correct. Yes. 24 Q. And you see that C stands for compliant; right? 25 A. That's correct.	536 1 You know what, Josh, I think the best way to do 2 this is go to JTX 0044.035. Then I'll tell you the specific 3 call out there. Thank you. 4 So if you could just do a close-up of Row 372, 5 the whole row, if possible, or at least through CV. Keep 6 moving to the right, please. That's perfect. 7 THE WITNESS: That is legible. I can read that. 8 MR. MCANDREWS: Could you please throw the 9 header in as well? Drag the header down a little bit just 10 so we can see which columns match up? Okay. 11 BY MR. MCANDREWS: 12 Q. So Mr. Miller, you see line 372, the requirement is 13 the device must be compliant with ITU 993.2 VDSL2 very high 14 speed digital subscriber line 2; correct? 15 A. Correct. 16 Q. And according to this document any way, in column CR 17 in row 372, there's a C; correct? 18 A. Correct. 19 Q. And in column CV all the way to the right up there, 20 row 372, there is a C; correct? 21 A. That's correct. 22 Q. Okay. But if you look in column CP, and this is the 23 5168 product; correct? 24 A. I'm assuming it is, if we're still on the same table. 25 Q. Yes, sir. Same exhibit?
535 1 Q. And NC stands for not compliant? 2 A. That's correct. 3 Q. And then you see there's others there including PC 4 for partially compliant; right? 5 A. Yes. 6 Q. Okay. I'd like to direct your attention down to 7 row 372 of JTX 044 which is a section -- I'm sorry. First, 8 let's move to the left on Page 1. Very front page, let's 9 move to the far left, top row. 10 Do you see JTX 44 refers to the 5168 products? 11 A. I see that. 12 Q. Correct? 13 A. Yes. 14 Q. Now, can we go down to row 372 of JTX 044? 15 A. Okay. Can we just slide over and make sure that's 16 row 72, please, or 372, whatever it was? 17 MR. MCANDREWS: Excuse me. Josh, he'd like to 18 see the row number so he's sure he's looking at the same. 19 THE WITNESS: Okay. 20 BY MR. MCANDREWS: 21 Q. Do you see that, Mr. Miller? 22 A. I do. Mm-hmm. 23 MR. MCANDREWS: Would you please slide to the 24 row to the left, please, Row 372, to the left so we can see 25 how it aligns?	537 1 A. Okay. Yeah. 2 Q. For that, there's an NC; correct? 3 A. Yes. 4 Q. And for software release 9.8X, the NC indication is 5 actually a mistake, though; correct? 6 A. I believe it's -- it's either a mistake or it's 7 possible there it's a -- this is an earlier version of the 8 Uber matrix, although it seems more likely that it's a 9 mistake since we have updates for 10.1 and 10.5 which come 10 after 9.8 in time. I would expect -- I would have expected 11 the 9.8 status to be accurate. 12 And as of the point of 10.1, my understanding is 13 that the 5168 product for the 9.8 release did comply with 14 line 372. 15 Q. Okay. So the NC would be a mistake on this then? 16 A. I think it is. 17 Q. Okay. Thank you. 18 Now, if you would, please turn your attention to 19 JTX 48, please. And more specifically -- I'll give it a 20 minute to pull up. 21 More specifically, I'd like to direct your 22 attention to JTX 0048.038. And that's row 372, I believe. 23 You know what, I may have had the call-out number there 24 wrong. I think you had it right there. 25 Okay. Perfect.

538 1 Could you slide a little bit to the right, 2 please, Josh? 3 Thank you. Thank you. That's perfect. 4 If you'd look down to the row -- I know we don't 5 see the row number any more, and it's tough to see. For 6 that, I apologize. 7 But you do see the requirement, the device must 8 be compliant with ITU-T 993.2 VDSL? You know what, I 9 apologize. 10 Could you please go to the top of this exhibit 11 so we know what product we're looking at? Very top of the 12 exhibit on the left-hand side. 13 I'm sorry. JTX -- there we go. This is -- can 14 you pan in on that, please? Sorry about that. 15 This section of the Uber matrix refers to the 16 5031NV product; correct? 17 A. Yes. 18 Q. Okay. Now, we're ready to go back to where I was. 19 So back down to row 372, please. 20 Okay. So row 372 once again has the requirement 21 -- states the requirement that the device MUST all caps be 22 compliant with ITU-T G.993.2 VDSL2 (very high speed digital 23 subscriber line 2. 24 It requires that requirement, doesn't it? 25 A. It does.	540 1 deposition? 2 MR. P. MCANDREWS: I was actually just getting 3 to it. Thank you. 4 BY MR. P. MCANDREWS: 5 Q. If you could pull up the second Miller deposition, 6 page 135, line 8, through -- this will carry on to the next 7 page. 8 A. Sure. 9 Q. Through 136, line 9. Okay? 10 A. Correct. 11 Q. And -- 12 MS. WALSH: Objection. I still don't believe 13 Mr. McAndrews has asked a question. 14 THE COURT: I'm going to overrule the objection. 15 Q. So this states as follows: 16 "Question: What is your understanding regarding 17 the 9.8.x release? Did you understand that to be in 18 compliance with the requirement that the 5031NV must be 19 compliant with 993.2 conditions? 20 "Answer: My recollection is the reason that's 21 marked NV is because maybe AT&T didn't expect to support 22 VDSL2 on 9.8.x on this product, and so AT&T just kept that 23 marked as -- or the parties communicating this understood 24 that that's a non-comply and that was essentially agreed 25 upon between AT&T and 2Wire.
539 1 Q. And once again, for 10.1 software release and 10.5, 2 software release, the Uber matrix indicates a C in row 372; 3 correct? 4 A. Correct. 5 Q. But as was the case with the 5168 -- I'll give it a 6 minute here. As was the case with the 5168, for 9.8 7 software release, there's an NC; correct? 8 A. Correct. 9 Q. But for this one as well, it's also your 10 understanding for the 5031 that the NC is also a mistake; 11 correct? 12 A. In this case, I don't think it's a mistake. 13 Q. Were you deposed in September of 2018 as well? 14 A. Yes. 15 Q. Okay. And with respect to this product, did you 16 testify, and this is at page -- 17 MS. WALSH: Objection. He hasn't asked a 18 question. 19 MR. P. MCANDREWS: I apologize. 20 Q. You were under oath during that deposition, 21 Mr. Miller? 22 A. Yes. 23 MR. P. MCANDREWS: I'm sorry. I did ask a 24 question, I asked if it was a mistake, Ms. Walsh. 25 MS. WALSH: Do you have a citation in the	541 1 "Question: Okay. But is it your understanding 2 that to the extent that 10.1.x was compliant with this 3 requirement that 9.8.x also was compliant? 4 Answer: Yes. Can you be more specific? 5 "Question: I think the reason you were telling 6 me why there was an NV there, I don't want to put words in 7 your mouth. I want to make sure this is accurate. I think 8 you were telling me that there is an NV there not 9 necessarily because 9.8.x wouldn't meet that requirement, 10 but that AT&T didn't expect it to and, therefore" -- 11 A. Excuse me. Can I see what he's reading, please, 12 while he's reading it. 13 Q. It's up there. I'm sorry. 14 A. It's lower, isn't it? 15 Q. Right there. I may have gotten ahead of it. This is 16 what I was just reading. 17 A. I'm sorry to interrupt. I thought it was different. 18 Is it okay to just start over where you were? 19 Q. Of course. No problem. 20 A. Okay. 21 Q. And again -- 22 THE COURT: But Mr. McAndrews, I'm actually 23 understanding the objection now. This is not what he was -- 24 this is different than what you were asking him. Why don't 25 you just ask him this and maybe he'll say it and we won't

542 1 have to do this. 2 MR. P. MCANDREWS: Okay. 3 BY MR. P. MCANDREWS: 4 Q. Mr. Miller, your understanding of the NV on the Uber 5 Matrix there is simply that AT&T didn't expect 2Wire's 6 product to comply there; correct? 7 A. Exactly. 8 Q. Thank you. 9 Now, you testified yesterday that when the Uber 10 Matrix says that a product is compliant with G.993.2, it 11 means that the product must be able to make VDSL connections 12 with the equipment that 2Wire's customer uses; correct? 13 A. That's correct. 14 Q. Let's take a quick look back at the Uber Matrix, 15 JTX-044, at rows 549 through 551. And you see in row -- 16 let's do 549. Row 549 states -- first of all, 549 states 17 that that's a required feature, not an optional feature, 18 right, there is an R there? 19 A. Yes. 20 Q. And this states, "The device must prove fully 21 compatible and interoperable with the DSLAM platforms 22 identified in the worksheet IP DSL platforms. Documentation 23 must be provided prior to AT&T acceptance of the device 24 which will support the proof of the physical layer 25 interoperability against all listed ATU-Cs and the	544 1 Q. And under key features and benefits -- first off, 2 these are marketing documents so they're directed to 2Wire's 3 customers; correct? 4 A. Correct. 5 Q. And as one of the key features and benefits in this 6 document, if you look at the bottom, key feature and 7 benefit, it says low total cost of ownership, do you see 8 that? 9 A. I do. 10 Q. Now, if I could direct your attention to the third 11 page of JTX-13. If you could pan in a little bit closer. 12 There we go. Under DSL modem, not only does it say VDSL2 in 13 the second row under VDSL2, two rows below that it is saying 14 VDSL-DMT, DMT stands for discrete multi-tone; is that 15 correct? 16 A. That's correct. 17 Q. It says per the G.993.2 standard, is that what that 18 document says? 19 A. Yes. 20 Q. Can we flip to JTX-14, please. And let's look at the 21 first page, so this is a data sheet for the 3801HGV product; 22 correct? 23 A. Correct. 24 Q. You said once again this is a marketing document 25 directed toward 2Wire's customers?
543 1 requirement continues on." Did I read that correctly? 2 A. Yes. 3 Q. And if you look to the right of that, there is not 4 only a C one cell to the right, but there is also a listing 5 of products for which 2Wire is targeting interoperability; 6 is that correct? 7 A. Yes. 8 Q. So interoperability with DSLAMs is identified as a 9 separate and distinct requirement from standard compliance 10 on the Uber Matrix; correct? 11 A. The Uber Matrix has separate lines for -- has 12 separate requirements as you stated. 13 Q. Thank you. 14 Now, I would like to direct your attention back 15 to some of the, I think you said they were marketing 16 documents that were directed to customers. So if we could, 17 I would like to direct your attention back to -- let's start 18 with JTX-13, please. 19 First of all, under key features and benefits, I 20 notice it says ADSL/VDSL pair bonding. Did this -- was this 21 a VDSL1 product, Mr. Miller, or a VDSL2? 22 A. Which product is this again? 23 Q. It's the 5268AC, but if you could go back to the 24 bigger document. 25 A. VDSL2 product.	545 1 A. Correct. 2 Q. And again, to the left there is a section called key 3 features and benefits, all the way to the left. There we 4 go. And down at the bottom, once again, it says low total 5 cost of ownership; correct? 6 A. Correct. 7 Q. Let's flip to the second page of this, please. On 8 the second page under broadband network interfaces, it 9 states once again that the VDSL-DMT is per the G.993.2 10 standard; is that correct? 11 A. That's correct. 12 Q. Thank you. 13 Could we please flip to JTX-17. And if I'm not 14 mistaken, I believe you said that you think the iNID, or the 15 iNID, reference is actually to the i3801 product? 16 A. I believe I testified i3812. 17 Q. i3812, that's correct. Sorry about that. 18 If you could please flip to page three of this 19 document. And you mentioned right there, you mention that 20 there were actually two -- I'm not sure if you used the word 21 modem. Did you use the word modem? 22 A. I may have. 23 Q. There is two modems, both of those modems are 24 reflected as being G.993.2 modems; correct? 25 A. As well -- yes, as well as the other -- actually

546 1 that's true, in this case for this product, it's only VDSL2. 2 Q. Thank you, Mr. Miller. 3 And let's please quickly flip to JTX 18. And 4 this is the -- this is once again a marketing data sheet for 5 2Wire's 5031NV product; correct? 6 A. That's correct. 7 Q. Now, if you could move down to key features and 8 benefits. Once again, this touts the low total cost of 9 ownership; correct? 10 A. Yes. 11 Q. And once again, I'll direct your attention to the 12 next page which again identifies technical specifications. 13 If you could pan in on where it says VDSL, and this one says 14 G.993.2 - compliant. And then it states Annexes A and B. 15 Did I read that correctly? 16 A. That's correct. 17 Q. Thank you. Finally, if we could please -- you know 18 what -- you know what, I accidentally lied and said finally. 19 I think I've got two more. 20 If you could please flip to JTX 19. JTX 19, 21 that's a data sheet. Once again, a marketing data sheet for 22 the 5168N product; correct? 23 A. Correct. 24 Q. Okay. And if we look, and again, this product did 25 not do VDSL1, did it?	548 1 key features and benefits, once again, the marketing 2 document touts low total cost of ownership; correct? 3 A. Correct. 4 Q. And if I could direct your attention to Page 2, and 5 once again, under the technical specifications, this says 6 that it's VDSL2. And then down a couple lines, it also says 7 per the G.993.2 standard. 8 Did I read that correctly? 9 A. Yes. 10 Q. All right. 11 MR. MCANDREWS: Thank you, Mr. Miller. I have 12 no further questions? 13 THE COURT: Any redirect? 14 MS. WALSH: No, Your Honor. 15 THE COURT: All right. Mr. Miller, you may step 16 down. Watch your step. All right. 17 THE WITNESS: Thank you. 18 MR. SCHUMAN: Your Honor, defendants call Dr. 19 Martin Walker. 20 THE COURT: All right. 21 DEPUTY CLERK: Are you all right to swear? 22 THE WITNESS: Yes. 23 DEPUTY CLERK: Please state and spell your full 24 name for the record. 25 THE WITNESS: Martin Walker. M-A-R-T-I-N
547 1 A. It did not, as far as I know. 2 Q. Okay. And under key features and benefits, the very 3 last one called out -- 4 A. Can I correct that last answer? I don't know for 5 sure that this product was not capable of it, but we did not 6 configure it for that support, that's for sure. 7 Q. Thank you, Mr. Miller. 8 Under key features and benefits, once again, 9 this marketing document reflects a low total cost of 10 ownership; correct? 11 A. Yes. 12 Q. And if you flip to Page 2 of this document? 13 A. Yes. 14 Q. Page 2 of this document under where it says DSL 15 modem, it indicates that it's VDSL2; correct? 16 A. Yes. 17 Q. And it also states that it is per G.993.2 standard; 18 correct? 19 A. Correct. 20 Q. Thank you. Now, I can say finally. 21 Finally, if you would please flip to JTX 20. 22 And this is a marketing data sheet for 2Wire for the 5168NV 23 product; correct? 24 A. Correct. 25 Q. Okay. If you could look on the first page down under	549 1 W-A-L-K-E-R. 2 DEPUTY CLERK: Place your left hand on the Bible 3 and raise your right hand. 4 MARTIN WALKER, after having been solemnly sworn 5 under oath, testified as follows: 6 MR. KLINE: Your Honor, I just have a set of 7 slides for you. 8 THE COURT: Sure. 9 MR. KLINE: Thank you. And Your Honor, just a 10 little explanation. There's a set of slides that include 11 some code, and there's a set of slides where there are 12 blanks where there was code. The full code, I'm just going 13 to put here. 14 THE COURT: Okay. 15 MR. KLINE: And we'll see on the screen, there 16 will be some slides. Fair enough? 17 THE COURT: Sure. 18 DIRECT EXAMINATION 19 BY MR. KLINE: 20 Q. Good morning, Dr. Walker. Could you introduce 21 yourself to the jury, please? 22 A. Excuse me. Good morning. My name is Martin Walker. 23 Q. And Dr. Walker, how do you understand your role in 24 this matter? 25 A. Well, I was engaged by defendant, 2Wire mas an expert

550 1 witness to comment on the characterizations of the operation 2 of the Broadcom chips by Dr. Almeroth. 3 Q. And have you prepared any slides to help explain your 4 testimony? 5 A. I have. 6 Q. All right. So let's start, Dr. Walker, with your 7 experience and education. I understand you went to MIT? 8 A. Yes, I graduated from MIT with a bachelor of science 9 in electrical engineering in 1973. 10 Q. Did you focus your undergraduate studies in any 11 particular area of electrical engineering? 12 A. I did. I focused on the design of circuits like the 13 transceiver circuit that we're going to be talking about 14 later today. 15 Q. And did you continue your education after MIT? 16 A. Yes. I moved to Stanford University where I received 17 my Ph.D. degree in 1979. 18 Q. What was the focus of your graduate studies at 19 Stanford? 20 A. At Stanford, I worked on a project called the 21 cochlear implants. What we did was we built the first 22 multi-channel cochlear implants. Those are electrodes that 23 we implanted into the auditory nerve of deaf human 24 volunteers. 25 Then I developed computer software and hardware	552 1 A. I again designed software to help design -- well, 2 CommSat, first of all, is a communication satellite company. 3 They're the ones that operated the satellites with -- and 4 communication -- and communication satellites. And my job 5 was to help design software that would -- software to help 6 design the components that went into those communication 7 systems. 8 Q. Following CommSat, what did you do next 9 professionally? 10 A. Well, I started my first high-tech startup company 11 called Analog Design Tools. 12 Q. What did that company do? 13 A. That company created a software system to help 14 engineers design chips. 15 Q. What was your experience, if any, with source code at 16 that company? 17 A. Well, the software system was written in source code, 18 and my job was to help design the product, implemented some 19 of the product by writing source code, and I also explained 20 the operation of the -- of the software system to people, 21 including our customer. 22 Q. What did you do following your experience at Analog 23 Design Tools? 24 A. Well, Analog Design Tools was acquired by a large and 25 public company called Cadence Design Systems. And then I --
551 1 source code that would stimulate these electrodes so that 2 the volunteers could again hear sounds. 3 Q. Did you receive training at MIT and Stanford 4 considering reading, writing, and analyzing source code for 5 computer programming? 6 A. I certainly did, and that's how I wrote the software 7 source code for my signal processing. 8 Q. What language was that in? 9 A. That was in C mostly. 10 Q. Did you work outside of Stanford while you were 11 completing your Ph.D.? 12 A. I did. I worked at Watkins Johnson Company which was 13 a military aerospace contractor. 14 Q. And what did you do there? 15 A. I designed hardware components for transceivers, for 16 microwave transceivers that allowed for communication 17 between, for instance, radios. 18 Q. Any experience with source code at Watkins? 19 A. I did. I wrote computer software systems and source 20 code to help design and test these microwave components. 21 Q. And what did you do after receiving your Ph.D. from 22 Stanford? 23 A. A little while later, I joined CommSat, the 24 communication satellite company. 25 Q. And what did you do at CommSat?	553 1 sometime later, I left Cadence to start work at my second 2 high-tech startup company called Symmetry Design Systems. 3 Q. What did Symmetry Design Systems do? 4 A. Symmetry Design Systems again created a software 5 system to help designers design circuits such as the 6 interface circuits in the transceivers that we will be 7 talking about more this afternoon or this morning, I hope. 8 Q. Did you read, write, and analyze source code at 9 Symmetry Design Systems? 10 A. I did. I -- my responsibility was to, among other 11 things, to write the source code for our systems and to 12 explain the operation of the -- of our systems and the 13 source code to other people, including my customers. 14 Q. How long were you at Symmetry? 15 A. I was at Symmetry until 1995 when I started my third 16 high-tech startup company in Silicon Valley. 17 Q. What was that? 18 A. That was Sequence Design. 19 Q. What did Sequence Design do? 20 A. Sequence provided computer software to help designers 21 design faster, lower powered chips. 22 Q. What kind of chips? 23 A. Semiconductor chips like the Broadcom chips that 24 we'll be talking about more. 25 Q. How long were you at Sequence Design?

554 1 A. I was at Sequence Design through the year 2000. 2 Q. And what did you do next? 3 A. I -- I left Sequence and found -- moved into a 4 consulting role. I founded my own consulting company called 5 the Brass Rat Group. 6 Q. Why Brass Rat? 7 A. Oh, brass rat is the nickname of the MIT class ring 8 and you know, nature's engineer. So there's a beaver on the 9 ring, and it's colloquially referred to as a brass rat. 10 Q. What does Brass Rat Consulting do? 11 A. I specialize in analyzing and understanding computer 12 hardware and software source code. 13 Q. So over the course of your long career in education, 14 have you received any awards concerning your software and 15 hardware design experience? 16 A. Yes, I have. In 1976, I received a microwave 17 engineer of the year award for the designs that I did at 18 Watkins Johnson Company for the -- for the components that 19 went into the transmitters and receivers. 20 Q. Anything at analog work bench? 21 A. Yes. The analog work bench, which was the name of 22 the product at Analog Design Tools, the product received an 23 award from the -- from Electronic Products Magazine as the 24 Product of the Year in 1984. 25 Q. And do I recall Fortune Magazine recognized one of	556 1 BY MR. KLINE: 2 Q. Dr. Walker, what were you asked to do in this case? 3 A. Well, I was asked to review the characterization of 4 the operations of the -- made by Dr. Almeroth regarding the 5 Broadcom chips. And to do that, I reviewed the documents 6 that were referenced by Dr. Almeroth including documents and 7 deposition testimony. But mostly I reviewed the computer 8 source code that defines the operation of the Broadcom 9 chips. 10 Q. So Dr. Walker, in view of your formal training at MIT 11 and Stanford, your over forty years of experience writing, 12 reading and analyzing source code, your review of 13 Dr. Almeroth's analysis and materials he relied upon 14 including the source code for the Broadcom chips, have you 15 formed any opinions in this matter concerning the question 16 whether Dr. Almeroth has correctly characterized the 17 functionality provided by Broadcom's source code? 18 A. I have. And I have some disagreement with some of 19 Dr. Almeroth's characterizations. 20 Q. Thank you, Dr. Walker. 21 Is there any background you can provide that 22 will assist us in understanding your opinions? 23 A. Sure. I prepared a slide or two to help us with 24 that. 25 Q. So Dr. Walker, what is this slide that you prepared?
555 1 the companies that you founded? 2 A. Yes. Fortune Magazine recognized frequency -- 3 Sequence Design as -- in 1999, I think, as a cool company. 4 So we received the cool company award from Fortune Magazine. 5 Q. And have you authored any publications in the area of 6 hardware and software design? 7 A. I have over the years. I've authored about 50 8 publications in the area of hardware and software design. 9 Q. Any patents in that field? 10 A. Yes. I have three patents that describe the soft -- 11 they cover the software that I wrote to help make chips run 12 faster and use less power. 13 Q. And are you being compensated for your work on this 14 matter? 15 A. I am. 16 Q. Does your compensation relate in any way to the 17 opinions that you offer and the outcome of the matter? 18 A. No, it doesn't. 19 MR. KLINE: Your Honor, I'd like to offer 20 Dr. Walker as an expert in the field of the creation and 21 analysis of computer programming source code for 22 communication hardware firmware and software. 23 MR. PRANGE: No objection, Your Honor. 24 THE COURT: Okay. You have proceed. 25 MR. KLINE: Thank you, Your Honor.	557 1 A. Well, this slide starts with the -- points out that 2 everything starts with the Broadcom source code. Broadcom 3 developers write the source code, and then the source code 4 -- then they compile the source code into something called 5 firmware. The firmware is incorporated into the Broadcom 6 chip and the Broadcom chip goes into the 2Wire modem to 7 provide the DSL functionality within the 2Wire modem. 8 Now, the Broadcom developers, Broadcom 9 developers write the source code. And the source code 10 itself defines exactly what the chip does. 11 So by studying the source code, I can determine 12 exactly what the chip does. And the way I think of the 13 source code is the gold standard for understanding the 14 operation of the chip. 15 Q. Excellent, Dr. Walker. Thank you. 16 After your review of the Broadcom source code 17 and the other materials, what did you determine would be the 18 relevant functions that you wanted to focus on? 19 A. Well, I wanted to focus on the operation of exactly 20 how the Broadcom chips handle certain messages. 21 Q. I think we prepared another slide. We heard a lot 22 about generally some of the matters at issue here, so we 23 don't need to belabor it, Dr. Walker, but just to place your 24 analysis and opinions in context, tell us a little bit about 25 the slide?

558 1 A. Sure. DSL as we heard over the last few days is all 2 about communicating data between the central office and the 3 modem. And to help set our focus here, I'm sure you all 4 recall that data flows from the central office to the 5 Broadcom chips, that's what's referred to as downstream 6 data, where it's received in the Broadcom chips, in the 7 deinterleaver in the Broadcom chips. 8 Equivalent -- or also there is an interleaver in 9 the Broadcom chips that generates data that flows in the 10 upstream direction to the central office. 11 Q. And Dr. Walker, you have heard several witnesses 12 referring over the last several days to an O-PMS message. 13 A. I have. 14 Q. What is that? 15 A. An O-PMS message is a message that flows from the 16 central office to the Broadcom chips. The O-PMS message has 17 a bunch of parts to it which we have been referring to as 18 parameters, and I have seen that the TQ Delta identified 19 certain of those parameters called max_delay_octet that are 20 particularly relevant. 21 Q. What do you understand the max_delay_octet to be? 22 A. Those are again, components of the O-PMS message that 23 are transmitted to the Broadcom chip. The important thing 24 is to understand what happens to those messages, how those 25 messages are used on the Broadcom chips.	560 1 A. There is two important functionalities, one is for 2 the interleaver and the other is for the deinterleaver. So 3 we're going to talk about each of these four cases, how each 4 of these two chips operate with respect to the interleaver 5 and the deinterleaver. 6 Q. So do I understand correctly we have two chips, two 7 functionalities, that's why we have four cells in this grid? 8 A. Yes. That's right. Two chips, and then interleaver 9 and deinterleaver for each chip. 10 Q. Let's focus first, Dr. Walker, on your analysis and 11 the conclusions you reached concerning the interleaving 12 function for the BCM6091 chip, what did you conclude there? 13 A. I have a slide to help us, to help explain that 14 point. 15 Q. So at this point, Dr. Walker, we are treating some 16 information a little differently than other information. We 17 have a got a blank on the slide that's shown on the screen. 18 But if I have any ability, I will be able to show both 19 sides. 20 So Dr. Walker, there is a reference on your 21 analysis to determining. What's going on here? 22 A. Well, I found that the source code does not use these 23 max delay parameters to specify a maximum amount of memory. 24 In fact, as I'll show you in a second, the source code shows 25 that the Broadcom chip doesn't use those parameters at all.
559 1 Q. How are they used on the Broadcom chip? 2 A. Well, I prepared a slide to help us talk about that. 3 Q. So I see analytical framework. What does this slide 4 show us? 5 A. Well, I wanted to answer the question of exactly how 6 the Broadcom chip used these max_delay_octets. So I 7 identified -- so this slide is intended to show the process 8 or organized my thoughts in this area. I identified three 9 functionalities that are of import here. The first one is 10 receiving the message. The second one is determining an 11 amount of memory to be allocated to the interleaver or 12 deinterleaver. And the third functionality is actually 13 allocating the memory to the interleaver or deinterleaver. 14 Now, there is really no dispute among -- about 15 -- that the Broadcom chips receive the data. So I'm going 16 to not discuss that function any further. What we are going 17 to talk about is the determination step and the allocating 18 step. 19 Q. So if we -- Dr. Walker, you have two columns, BCM6091 20 and BCM63X68. What do those columns in the slide represent? 21 A. Well, as part of my analysis, I realized that there 22 were two sets of software code, each set corresponding to 23 either the BCM6091 device or the 63X68 chip. 24 Q. And we got rows interleaver and deinterleaver. What 25 do those indicate?	561 1 Q. Did you say the Broadcom chip? Which Broadcom chip 2 are we talking about? 3 A. This is the 6091 chip. 4 Q. Is this interleaver or deinterleaver? 5 A. The interleaver on the Broadcom chip. 6 Q. So I see in the full slide, I'll make a reference to 7 BRCM code 0039 at line 3282. To what extent does that chip 8 play a role in your analysis and conclusion? 9 A. As you can see there, it's actually pretty 10 straightforward. The Broadcom chip calculates an amount of 11 memory that is at least equal to, you can see two lines 12 there, the middle line is a little bit lighter type, it's a 13 comment, and then the darker type line is the actual source 14 code. You can see the MK plus 8 -- I'm sorry, it's 3 times 15 MK plus 8. The 3 is in red, and then it goes MK plus 8 plus 16 I minus 1 times D minus 1. So that explains that the 17 interleaver memory is at least three times MK plus 8, plus I 18 minus 1 times D minus 1. That's the formula that the 19 Broadcom chip, the source code, the gold standard source 20 code uses to define the memory associated with the 21 interleaver. 22 Q. And I'm sorry, I was checking something, Dr. Walker. 23 Is the max_delay_octet in this formula at all? 24 A. No, it's not. 25 Q. So then how about allocation, did you look at the

562 1 code that Dr. Almeroth focused on for allocation and draw 2 any conclusions about that? 3 A. Well, Dr. Almeroth didn't identify any code that 4 actually allocates the memory. 5 Q. Thank you. 6 So if we move -- remembering what your grid was, 7 if we move to the deinterleaver function of the 6091 chip, 8 we should have, if I did that correctly. So how about this, 9 Dr. Walker, can you help us understand the deinterleaver 10 function for the BCM6091 chip? 11 A. Sure. The BCM6091 chip deinterleaver allocates 12 memory in a simpler fashion than the interleaver that we 13 just looked at. 14 Q. How does it do that? 15 A. What the source code tells us is that there is a 16 total amount of memory for the -- available for the 17 interleaver and the deinterleaver. And then what the source 18 code says is that you subtract off the amount used by the 19 interleaver, you subtract off a little bit more of what it 20 calls a guard ban and it elevates everything else to the 21 deinterleaver. Pretty straightforward. 22 Q. Does max_delay_octet factor into that? 23 A. Not at all. 24 Q. And with respect to allocation, what did you conclude 25 with regard to the allocation functionality for the BCM6091	564 1 A. None of the source code identified by Dr. Almeroth 2 actually allocates the memory. 3 Q. And then finally, and I don't -- we have source code 4 on the next one. Tell me about -- tell us about your 5 analysis for the BCM63X68, deinterleaver, how is the 6 determination made there? 7 A. Well, the determination -- 8 MR. PRANGE: Your Honor, request a side-bar. 9 THE COURT: All right. 10 (Side-bar discussion:) 11 THE COURT: Go ahead. 12 MR. PRANGE: Your Honor, you may recall there 13 was a discussion of the slides. We had an objection to the 14 slide that is presently on the screen. This is the original 15 slide that looks like this. We're concerned that the 16 question that's just been asked by Mr. Clark here -- 17 MR. KLINE: Mr. Kline. 18 MR. PRANGE: Excuse me, Mr. Kline, that the 19 device going into the analysis -- 20 THE COURT: The one I changed yesterday? 21 MR. PRANGE: Correct, Your Honor. 22 MR. KLINE: He's not going to talk about code. 23 MR. PRANGE: I didn't think he could talk about 24 anything. The objection we had was it was simply a summary 25 point in his rebuttal report that simply said it wasn't
563 1 chip deinterleaver? 2 A. So none of the source code that Dr. Almeroth has 3 identified allocates memory. 4 Q. And next, the other chip that we've heard quite a bit 5 about is referred to as BCM63X68 chip. Focusing first on 6 the interleaver functionality, could you explain to us how 7 that works, Dr. Walker? And I have slide 8 if that's 8 helpful to you. 9 A. So the BCM63X68 interleaver uses a more complicated 10 function. It basically first calculates a required amount 11 of memory and then in the next step which is the bottom step 12 here where it says interleaver memory equals the max of two 13 quantities. Max means, and those two quantities are what 14 amounts to the max delay message and this other computation 15 which is what it calls required interleaver memory. 16 So the way this works is that the amount of 17 memory that this code can allocate is at least the amount 18 specified in the -- by the max_delay_octet, or maybe more. 19 So in that way, the max_delay_octet specifies a minimum 20 amount of memory which is the polar opposite of a maximum 21 amount of memory. So again, the source code does not use 22 the max_delay parameter to determine a maximum amount of 23 memory. 24 Q. How about allocation for the interleaving function on 25 the BCM63X68?	565 1 there but didn't go into detail about his analysis. 2 THE COURT: I think that's what Mr. Kline said 3 he's going to do. 4 MR. KLINE: I'm not going to talk about that. I 5 can simple ask him whether the source code uses the 6 max_delay_octet parameters to -- does it use the max_delay 7 parameter to ensure the deinterleaver memory does not exceed 8 a maximum number of bytes, I can ask him that question. 9 THE COURT: Okay. 10 MR. PRANGE: All right. 11 (End of side-bar.) 12 BY MR. KLINE: 13 Q. Thank you, Dr. Walker. I just have one question. So 14 the source code for the BCM6368 deinterleaver function, does 15 it use the max_delay_octet parameter to ensure that the 16 interleaver memory does not exceed a maximum number of 17 bytes? 18 A. No, it does not. 19 Q. Thank you. 20 And how about allocation with respect to the 21 63X68 deinterleaver, what did you look at there and what did 22 you conclude? 23 A. That none of the source code Dr. Almeroth has 24 identified allocates memory. 25 MR. KLINE: Very good. Pass the witness, Your

566 1 Honor. 2 THE COURT: All right. Cross-examination. 3 MR. LINDEN: Your Honor, may I approach? 4 THE COURT: Sure. 5 CROSS-EXAMINATION 6 BY MR. PRANGE: 7 Q. Good morning, Mr. Walker. 8 A. Good morning, Mr. Prange. 9 Q. We've met before, haven't we? 10 A. Yes. 11 Q. A couple times? 12 A. Yes. 13 Q. So Dr. Walker, you're currently the CEO of Brass Rat 14 Group? 15 A. I'm the president of Brass Rat Group, yes. 16 Q. And that's a company in Silicon Valley? 17 A. Yes. 18 Q. Okay. And you founded the company in 2001? 19 A. That's right. 20 Q. Okay. And one thing your company specializes in is 21 litigation consulting; is that correct? 22 A. Yes. I do litigation consulting and technology 23 consulting. 24 Q. And I think you have in front of you your report, and 25 there's a couple of these. So if you look in your --	568 1 technology issues including testifying in Federal Court and 2 the ITC on matters relating to infringement and validity of 3 various patents as well as misappropriation of trade 4 secrets." 5 Did I read that right? 6 A. Yes. 7 Q. And you're not offering a non-infringement opinion 8 today; correct? 9 A. That's correct. 10 Q. And you're not offering a -- you're not offering a 11 validity or an invalidity opinion here today? 12 A. That's also correct. 13 Q. And in fact, I think during your direct examination, 14 you didn't mention any of the patents at all; correct, by 15 number? 16 A. Oh, that's right. My job is to talk about how the 17 chip works. 18 Q. Right. And I looked at your CV, and if you start at 19 Page 3 and I actually just went up -- it looks like it goes 20 from Page 3 to Page 24, are all of your litigation projects; 21 correct? 22 A. Well, all of -- technically all of the 23 non-confidential projects. 24 Q. Right. There might be some others you can't put on 25 here so we know what those are?
567 1 there's a Walker Cross Binder 1 of 2. Do you have that in 2 front of you? 3 A. Yes. 4 Q. And that is -- in fact, there's a tab of 12/28/18 5 Walker Rebuttal Report. Is that -- are you there? 6 A. Twelve -- yes, I found it. 7 MR. PRANGE: And, Josh, if you can put up PTX 8 181, please. 9 BY MR. PRANGE: 10 Q. And that's up on the screen, Dr. Walker. Is that the 11 cover page? 12 A. Yes. 13 Q. Okay. And as part of this, you provided a Curriculum 14 Vitae; correct? 15 A. I'm sure I did. 16 Q. And if you flip forward to that, it's probably 17 halfway through, and it's PTX 181-0027. 18 Is that -- do you see that? 19 A. Yes. 20 Q. And so in the middle there, the big middle, that's 21 litigation experience. That's the first thing substantively 22 that you talk about on your CV; correct? 23 A. That's right. 24 Q. And the first sentence says, "Dr. Walker has 25 testified in jury trials and arbitration involving software	569 1 A. Right. 2 Q. Okay. And you're not relying on any of those 3 confidential ones as a basis for your qualifications today; 4 correct? 5 A. That's correct. 6 Q. Okay. And you're charging \$400 an hour for your time 7 for this case; correct? 8 A. Yes. 9 Q. 2Wire is paying you the \$400 an hour? 10 I'll rephrase. Someone's paying you \$400 an 11 hour; correct? 12 A. Yeah, right. 13 Q. And that \$400 an hour is every hour that you're here 14 in the courtroom? 15 A. Yes. 16 Q. And is it every hour that you're working somewhere 17 where you're staying here in town? 18 A. Yes, I -- sure. 19 Q. And now, before this case, at least with all of these 20 litigation projects, none of them addressed DSL specifically 21 in terms of what we're talking about in this case; correct? 22 A. That's -- that's correct. But a whole lot of them 23 were hardware and software systems in software source code, 24 and quite a few of them were directed to communication 25 systems.

1 Q. Right. But not applying DSL standards, for example,
2 for evaluating DSL standards; right?
3 A. **Right.**
4 Q. Now, speaking about the DSL standards, I didn't hear
5 you offer any opinion today on whether or not the source
6 code complies with the DSL standard; correct?
7 A. **That's -- yes, my job, again, here's how the chip**
8 **works. I do my very best to explain how the chip works.**
9 Q. And you didn't compare the source code with the
10 operation of the device to the standards; correct?
11 A. **That's correct.**
12 Q. Okay. Now, in forming your opinions today, I think I
13 saw in your report also that you reviewed the testimony of
14 Broadcom's corporate witness; correct?
15 A. **Yes.**
16 Q. And that was a deposition transcript?
17 A. **Yes, that's right.**
18 Q. And that person was Dr. Yu?
19 A. **Yes.**
20 Q. And you haven't spoken to Dr. Yu, though; right?
21 A. **Never.**
22 Q. Okay. And are you aware that Dr. Yu testified that
23 it was typical for Broadcom engineers on the CPE side to
24 consult ITU standards when writing code for Broadcom DSL
25 chip sets?

1 A. **I don't remember that specific part of the**
2 **deposition, though I certainly haven't memorized the entire**
3 **deposition.**
4 Q. And just to be clear, though, you weren't asked to
5 analyze the Broadcom source code to determine whether it
6 complies with the standards?
7 A. **No. I was asked to analyze the Broadcom source code**
8 **and talk about how it works.**
9 Q. So, Dr. Walker, I want to start with --
10 (Discussion held off the record:)
11 BY MR. PRANGE:
12 Q. So I'd like to put up a slide out of your examination
13 that you used, and I think it's DDX 0001-5. There we go.
14 That's your analytical framework?
15 A. **Yes.**
16 Q. And in terms of summarizing your opinions, that there
17 is the summary of your disagreement with Dr. Almeroth's
18 testimony; correct?
19 A. **No, that's -- as I was explaining, that's the**
20 **framework in which I formed my opinions about the operation**
21 **of the chips of each of the chips and with respect to the**
22 **interleaver and the up -- deinterleaver.**
23 **Then, in the next several slides, I talked about**
24 **the specific -- I talked specifically about how the actual**
25 **chips worked.**

1 Q. Right. And we'll get to those slides in a minute,
2 but just with this one, this is the summary you wanted to
3 start with to show how you were going to look at and do your
4 analysis?
5 A. **Yeah, that's exactly right.**
6 Q. Now, you didn't present any opinions disagreeing with
7 Dr. Almeroth that in the 63x68 code, the code is capable of
8 receiving an O-PMS message; correct?
9 A. **Actually I specifically said -- I specifically**
10 **testified that it did receive an O-PMS message.**
11 Q. Right.
12 A. **Yes.**
13 Q. You do agree?
14 A. **I do agree.**
15 Q. Now, also, in -- just to go to the other code base
16 which is the 6091 code, you also agreed that that code base
17 is capable of receiving the O-PMS message; is that correct?
18 A. **Yes. That's -- yeah, that's what I testified.**
19 Q. And I think you also agreed that in the 63x68 code,
20 the O-PMS message is processed after it is received;
21 correct?
22 A. **Well, yes, it is considered. That's right.**
23 Q. And in the 6091 code, the O-PMS message is processed
24 after it is received; correct?
25 A. **That wasn't my testimony. My testimony was that with**

1 **respect to the interleaver and deinterleaver, it's not used**
2 **at all.**
3 Q. Well, we'll get to -- I want to get to use in a
4 minute.
5 A. **Mm-hmm.**
6 Q. But in terms of just -- I just want to make sure I
7 understand whether you're agreeing with Dr. Almeroth. You
8 don't have a disagreement on the fact that the 6091 code
9 also will process an O-PMS message after it's received?
10 A. **I'm sorry. I'm struggling a little bit because to**
11 **the -- I mean, the message is received. It's stored in a**
12 **data structure.**
13 Q. And it's processed?
14 A. **It's stored in a data structure. That's -- that's**
15 **what it does with it.**
16 Q. So in the 6091 code set, that code set shows that
17 it's capable of determining an amount of memory required by
18 the deinterleaver?
19 A. **The code certainly determines an amount of memory**
20 **required by the deinterleaver.**
21 Q. Okay. In addition, is it also the case that in the
22 6091 code, the algorithm first determines the amount of
23 memory not available for deinterleaving and then assigns the
24 balance of the memory to the deinterleaver memory?
25 A. **That's -- that's -- yes, that's consistent with what**

574 1 I explained -- how I explained. I think everybody recalls I 2 explained that there's a total amount of memory. You take 3 away the amount for the deinterleaver and less a little bit 4 more of a guard band, and everything else is available for 5 the deinterleaver. 6 I think I said that backwards, didn't I? 7 Q. Well, I think you testified earlier, and I tried to 8 write this down, that your testimony is relating to the 9 determining step. That in determining it does not use the 10 max delay parameters to determine the amount of memory for 11 the deinterleaver; is that right? 12 A. That's right. 13 Q. Okay. Can you put up PTX 2, please? Can you skip to 14 the claims? 15 MR. KLINE: Your Honor I'm going to object. 16 It's beyond the scope. I'll leave it at that. 17 MR. PRANGE: Your Honor, I want to just clarify 18 about why he's looking at or whether it's relevant for him 19 to be looking at the use. 20 THE COURT: Well, that's -- no, I think that's 21 something to do with someone else or his argument, so I'm 22 going to sustain the objection. 23 BY MR. PRANGE: 24 Q. Now, Dr. Walker, I think you testified earlier 25 that -- and I think you did it for every step, none of the	576 1 Dr. Almeroth's report and determine whether and to what 2 extent you agreed with it? 3 A. And to determine if and to what extent I disagreed 4 with it. 5 Q. Okay. So I think we agree that's what your 6 assignment was? 7 A. Yeah. 8 Q. And is it that your assignment did not include 9 figuring out how the source code worked separate from what 10 Dr. Almeroth said in his report? 11 A. Well, I did need to figure out how the coded cited by 12 Dr. Almeroth worked together to perform the functions that 13 were characterized by Dr. Almeroth. So I looked how the 14 code identified by Dr. Almeroth, I formed my own opinions 15 about how that code worked. 16 Q. Well, in your testimony earlier today, you didn't 17 explain a different way that it would be allocated in 18 comparison to what Dr. Almeroth testified about; correct? 19 A. Well, Dr. Almeroth didn't describe any way it would 20 be allocated. He described how the amount of memory could 21 be determined, but he didn't describe anything about 22 allocating. 23 Q. There were -- he had a number of conclusions earlier. 24 Were you in the courtroom for that? 25 A. Right.
575 1 source code that Dr. Almeroth has identified allocates 2 memory; did I say that correctly? 3 A. You did. Would you like me to explain that? 4 Q. No. I just want to first make sure that we're 5 oriented correctly. 6 MR. PRANGE: And Josh, could you put up DDX 001? 7 Let's go to 1-6, please. Is that the redacted version? 8 (Discussion held off the record.) 9 BY MR. PRANGE: 10 Q. That's that statement -- that's the same statement 11 all the way through for all of your analysis relating to 12 allocating? 13 A. That's right. 14 Q. And just to be -- you didn't show a single piece of 15 code showing how the memory allocates for a deinterleaver; 16 correct? 17 A. That's right. 18 Q. And you didn't show a single piece of code showing 19 how the memory allocates for the deinterleaver; correct? 20 A. That's correct. 21 Q. And that's because you weren't asked to actually show 22 how the code actually works; correct? 23 A. Well, no. It's because Dr. Almeroth didn't identify 24 the source code that actually allocates memory. 25 Q. So for your assignment, was it to review	577 1 Q. Right. And he went through each of the limitations 2 that he was talking about; correct? Do you recall that? 3 A. I don't recall Dr. Almeroth doing a limitation by 4 limitation analysis of the patents. Maybe I got -- maybe I 5 missed something. 6 Q. Do you recall that he provided some analysis that 7 related to specific limitations? 8 A. He provided some analysis of the operation of the 9 code. 10 Q. And he related those to different parts of the 11 patent; correct? 12 A. I mean, I certainly was able to relate them to 13 different parts of the patent, yes. 14 Q. Now, but just to be -- I think I'm understanding you. 15 As part of your task, did you look to figure out how the 16 code worked without relying on what Dr. Almeroth says in his 17 report? 18 A. Well, I looked -- I read Dr. Almeroth's report and 19 the infringement contentions prior to me studying the source 20 code, so my study of analysis of the source code began with 21 the infringement contentions which were essentially the same 22 as Dr. Almeroth's report. 23 Q. You produced a report, though, you produced two 24 reports in this case? 25 A. Yes.

578 1 Q. And I just want to make sure I got -- is this -- do 2 you have Dr. Almeroth's report up with you? 3 A. I do. 4 Q. And is this the one? 5 A. It's the one that has the claim charts printed in a 6 way that I don't need my reading glasses to read them, so I 7 thank you very much for that version of the report. 8 Q. You're welcome, sir. 9 And that has tab A through L and then I think 10 there another one, M, in another of his reports? 11 A. That's right. 12 Q. And you offered -- I'm trying to find it. There they 13 are. You offered two reports, and I think they're in your 14 Walker cross number one book; is that right? 15 A. Let's see. It's a little bit dangerous here. There 16 is too many binders going on. So it's Walker cross one has 17 both my rebuttal report and my supplemental report. 18 Q. Right. One is dated, the first is dated December 28, 19 2018, and the second is February 4th, 2019? 20 A. Yes. 21 Q. It's these two? 22 A. Yes. I can't see what you're holding, but they're 23 both in the binder. 24 Q. I'll represent to you I'm holding the same ones. 25 A. Sounds good.	580 1 Q. Do you know whether the computers that are in 2 Minneapolis are the same as the computers that you looked 3 at? 4 A. Well, that's a strong statement. I believe they are. 5 And I did some work to make sure that they are. 6 Q. And was that work by taking the printouts that 7 Dr. Almeroth had and compare those to what you saw in the 8 computer on the electronic source code that you had? 9 A. Yeah. The computer and the cites. 10 Q. And -- 11 A. I'm sorry, the printout and the cites, that's right. 12 Q. But you didn't run a comparison of the source code 13 that was made available to you with the source code that was 14 in Minneapolis that Dr. Almeroth relied on; correct? 15 A. No, I relied on what I understood was that Broadcom 16 was producing the same source code that they produced in 17 Minneapolis, they made available through their attorneys in 18 Palo Alto. Then I checked to make sure there weren't any 19 inconsistencies, like missing files, or different files, and 20 I wasn't able to find them. 21 Q. How would you figure out if there were different 22 files or missing files between the two if you had never seen 23 the computer that's in Minneapolis? 24 A. Well, like I said, I looked at the -- that 25 Dr. Almeroth had selected a bunch of files, a bunch of pages
579 1 Q. And as part of your analysis you made it clear, you 2 looked at the source code? 3 A. Yes. 4 Q. And you looked at the source code in Palo Alto, 5 California; right? 6 A. I did. 7 Q. And did you say you spent two days looking at the 8 source code in mid January; is that right? 9 A. That's correct. And I spent another few days in -- 10 later. 11 Q. Later, around March, maybe March, April? 12 A. Yes, some -- you may remember better than I. 13 Q. Is it like about four days total that you looked at 14 the source code? 15 A. About four days. 16 Q. And Dr. Almeroth -- 17 A. I'm sorry, to be clear, it's about four days looking 18 at the electronic version of the source code. There is the 19 printed source code that I spent a lot more time reviewing. 20 Q. Yes. 21 And Dr. Almeroth looked at the code, though, in 22 Minneapolis; is that right? 23 A. That's right. 24 Q. In a secure repository in Minneapolis? 25 A. So I hear.	581 1 of source code for printing out, a whole box full of source 2 code. And he also cited by file name including complete 3 path of the file name, and line number. And I checked that 4 the full path name and the line numbers matched up. 5 Q. Very diligent. 6 And did you run a comparison of the source code, 7 the electronic source code produced in Minneapolis with the 8 electronic source code that was produced in Palo Alto? 9 A. No. They were both on stand-alone computers, so I 10 relied on what I understood. And then like a good -- and 11 being cautious, I did some verification. So I understood 12 that Broadcom represented that it was the same source code, 13 and then I did some checking, some verification. 14 Q. So when you were doing your review of the code, you 15 spent four days reviewing the code? 16 A. I think that's right, yeah. No, again, I spent a lot 17 more time than four days reviewing the code. 18 Q. You spent four days reviewing the electronic source 19 code? 20 A. That's right. 21 Q. So when you were doing your review, you did not find 22 -- excuse me, I'm going to start over just to orient. 23 For the 6091 code base, so when you were doing 24 your review, you did not find where in the code there was a 25 memory allocated to the interleaver; is that correct?

582 1 A. I didn't find the source code that actually allocated 2 the memory to the interleaver. 3 Q. That's what I said, the interleaver. 4 A. Yes, the interleaver. That's right. 5 Q. Thank you for being precise. 6 Now, also for the 6091 code set, you also did 7 not find where in the firmware code there was a memory 8 allocated to the deinterleaver; correct? 9 A. I think you misstated the question. Where memory was 10 allocated to the deinterleaver, and that -- and I wasn't 11 able to find that, either. 12 Q. And is it the case that, in fact, you don't know how 13 the source code performs memory allocation for a 14 deinterleaver? 15 A. Dr. Almeroth didn't cite to the source code that 16 actually allocates the memory, and I wasn't able to find 17 that source code, either. 18 Q. Now, you weren't able to find the source code with 19 your -- is it your independent search? 20 A. Either in the printed code or in the electronic code 21 which I searched. 22 Q. And you were here in the courtroom listening to 23 Dr. Almeroth's testimony; right? 24 A. Right. 25 Q. And he provided testimony and identified source code	584 1 Q. Just a couple of questions, Dr. Walker. I felt -- 2 maybe I didn't understand something while determining 3 allocating. Can I get the pizza slide. 4 So how do you distinguish between the 5 determining step and an allocating step? 6 A. Well, as Mr. Schuman explained, he asked his wife to 7 save him two slices of pizza. And then that's -- he 8 determined that he wanted two slices of his pizza. Then his 9 wife presumably said he's going to get those two slices of 10 pizza. Those are the two slices of pizza that are actually 11 allocated to Mr. Schuman as opposed to just two slices of 12 pizza. So there is two distinct steps here. One is 13 determining that he wanted two slices of pizza. The second 14 step is picking out those two specific slices, the amount of 15 pizza between 10 o'clock and 12:30. 16 Q. Thank you. 17 A. And in memory land we call that determining the 18 addresses, so that would be maybe the seventh and eighth 19 piece of pizza. 20 Q. Thank you. You can turn that off. 21 You got a lot of questions about your review of 22 the code. You reviewed some printed -- well, first of all, 23 why didn't you just go to Minneapolis and look at the code? 24 THE COURT: Wait. Can I see counsel at 25 side-bar.
583 1 that in his opinion related to allocating memory to an 2 interleaver? 3 A. Well, he identified source code that determined an 4 amount of memory that could be allocated to an interleaver, 5 for example, so that your statement is exactly correct, it's 6 related to allocating memory, but it is not actually 7 allocating memory. 8 Q. So do you disagree that in the accused products there 9 is no allocation of memory at all? 10 A. No, I am sure that there is -- well, sure, I don't 11 disagree -- I believe there is allocation of memory. What I 12 don't know about and what is critical for this case, it's 13 not any allocation of memory that's important, it's 14 allocation of memory so that the allocated memory does not 15 exceed the amount of memory specified in the message. So I 16 am sure there is some allocation of memory, but that doesn't 17 -- that's not really the critical issue, it's a very 18 specific allocation of memory that's important here. 19 Q. Right. 20 MR. PRANGE: Thank you, Dr. Walker. No further 21 questions. 22 THE COURT: All right. Any redirect? 23 MR. KLINE: Just a few, Your Honor. 24 REDIRECT EXAMINATION 25 BY MR. KLINE:	585 1 (Side-bar discussion:) 2 THE COURT: Maybe my memory is wrong, but isn't 3 this getting into a slide show about discovery disputes and 4 things? 5 MR. KLINE: I wanted him to say he's not 6 allowed, very similar to Dr. Almeroth saying that there was 7 a court order that prevented -- 8 THE COURT: That probably shouldn't have been 9 done either, but it was. I'm on top of this one. 10 MR. PRANGE: Your Honor, I don't think that 11 question is appropriate at all. 12 THE COURT: I'm going to sustain my own 13 objection here. 14 MR. KLINE: Fair enough, Your Honor. 15 Pardon me. May I ask him his understanding of 16 who selected the printed code that he reviewed? 17 THE COURT: You can ask him the code he 18 reviewed, did it come with a report. 19 MR. PRANGE: I'm not following what the question 20 is. 21 MR. KLINE: He talked about he reviewed printed 22 code. I would like to ask him who selected the printed code 23 that you reviewed. 24 THE COURT: Well, is it the printed code that 25 Dr. Almeroth identified in his report? Yeah, I don't see

586 1 any problem with that. 2 MR. PRANGE: Right. 3 MR. KLINE: And that he -- he understands he 4 reviewed all of the code that Dr. Almeroth printed. 5 MR. PRANGE: That's fair. 6 THE COURT: Okay. 7 BY MR. KLINE: 8 Q. Thank you, Dr. Walker. One, maybe two questions. 9 You mentioned you reviewed printed code; is that 10 correct? 11 A. Yes. 12 Q. Who selected the code that you -- who selected the 13 code that was printed that you looked at? 14 A. Well, I now understand Dr. Almeroth selected the code 15 that was printed. 16 MR. KLINE: Fair enough. I have no further 17 questions. 18 MR. PRANGE: Your Honor, may I ask one question? 19 THE COURT: If it's about pizza. 20 MR. PRANGE: It is about pizza. 21 THE COURT: All right. 22 RE CROSS-EXAMINATION 23 BY MR. PRANGE: 24 Q. Dr. Walker, do you believe a dad requesting two 25 slices of pizza is an accurate analogy for what is specified	588 1 DEPUTY CLERK: All rise. 2 THE COURT: Oh, I'm sorry. Did you resolve the 3 question about whether she's going to be identified as a 4 lawyer, too? 5 MR. SCHUMAN: I think that was resolved when you 6 asked Mr. McAndrews and I both, that she's not going to be. 7 THE COURT: I thought Mr. McAndrews was 8 reserving judgment, but actually the agreement is -- 9 MR. MCANDREWS: Yes, Your Honor. I'm going to 10 reserve judgment until she speaks. Yes. 11 THE COURT: No. No. You've got to tell me now. 12 Are you going to bring up that she's a lawyer? 13 MR. MCANDREWS: If she doesn't bring it up, 14 we're not going to bring it up because ultimately she's not 15 going to provide any legal opinions on the stand. 16 THE COURT: Well, hopefully she's not. Good. 17 (Recess was taken.) 18 DEPUTY CLERK: All rise. 19 THE COURT: All right. If Dr. Jacobsen's here, 20 she should come forward. 21 MR. SCHUMAN: I just wanted to mention one thing 22 we discussed, that the parties believe we're moving along at 23 a sufficient clip that we think that if you wanted to give 24 the jury an extra 15 minutes for lunch today, it shouldn't 25 be a problem with timing.
587 1 in the max_delay_octet message of the O-PMS? 2 A. I was trying to explain the distinction between 3 allocating and determining and allocating by using the pizza 4 analogy. I wasn't analogizing -- I wasn't analogizing 5 pizzas to max_delay_octets. 6 MR. PRANGE: Your Honor, move to strike. I'd 7 ask for a yes or no answer. 8 THE COURT: I'm going to -- I'm not going to 9 strike it. 10 MR. PRANGE: Thank you, Your Honor. Thank you, 11 Dr. Walker. 12 THE COURT: All right. You may step down. 13 Watch your step. 14 All right. Members of the jury, we'll take our 15 morning break here. So we'll start again just shortly 16 before 11 o'clock. 17 If we can take the jury out, please. 18 (Jury leaving the courtroom at 10:44 a.m.) 19 THE COURT: All right. Who's the next witness? 20 MR. SCHUMAN: Dr. Jacobsen, Your Honor. 21 THE COURT: Okay. And I take it -- is she both 22 infringement and invalidity? 23 MR. SCHUMAN: Correct, Your Honor. 24 THE COURT: Okay. All right. We'll be in 25 recess until just before 11:00.	589 1 THE COURT: Okay. Well, just to make sure 2 that's not a problem, I will be charging you 3 seven-and-a-half minutes each for that, but okay. Sure. 4 (Jury entering the courtroom at 11:00 a.m.) 5 THE COURT: All right. Members of the jury, 6 welcome back. Everyone, you may be seated. 7 You can call your witness. 8 MR. SCHUMAN: Thank you, Your Honor. 2Wire 9 calls Dr. Krista Jacobsen. 10 DEPUTY CLERK: Do you prefer to swear or affirm? 11 THE WITNESS: I'll swear. 12 DEPUTY CLERK: Please state and spell your full 13 name for the record. 14 THE WITNESS: Krista Susan Jacobsen, K-R-I-S-T-A 15 S-U-S-A-N J-A-C-O-B-S-E-N. 16 DEPUTY CLERK: Please place your left hand on 17 the Bible and raise your right hand. 18 KRISTA S. JACOBSEN, having been duly sworn under 19 oath, testified as follows: 20 DIRECT EXAMINATION 21 BY MR. SCHUMAN: 22 Q. Good morning, Dr. Jacobsen. 23 A. Good morning. 24 Q. Can you please introduce yourself to the members of 25 the jury?

1 **A. Sure. My name is Krista Jacobsen.**
2 **Q. Dr. Jacobsen, why are you here today?**
3 **A. I'm here as a DSL expert to help with understanding**
4 **the technology and also to offer my opinion on whether the**
5 **2Wire accused products infringe the TQ Delta patents. Also,**
6 **whether the TQ Delta patents are invalid, and to talk to you**
7 **about how I feel a person having ordinary skill in the art**
8 **would have understood the certificates of correction that**
9 **were issued in the '381 and '882 patent.**
10 **Q. Thank you.**
11 **MR. SCHUMAN: And before we go on, Your Honor,**
12 **we do have slides --**
13 **THE COURT: Sure.**
14 **MR. SCHUMAN: -- and some binders to pass up.**
15 **BY MR. SCHUMAN:**
16 **Q. Dr. Jacobsen, can you please summarize your**
17 **educational background for the members of the jury?**
18 **A. Sure. I went to the University of Denver for**
19 **pioneers and got my bachelor's degree in electrical**
20 **engineering in 1991. I then went to Stanford University to**
21 **get my master's and Ph.D., also both in electrical**
22 **engineering. Got my master's in '93 and my Ph.D. in 1996.**
23 **Q. Now, did you have any scholarships in connection with**
24 **any of your education?**
25 **A. I did, yes.**

1 **Q. Can you describe those for the members of the jury,**
2 **please?**
3 **A. Well, in undergraduate school, I had what was called**
4 **an honors scholarship which paid half tuition. I also had**
5 **one that was called the Colorado Scholarship, I think.**
6 **And then for graduate school, I had a National**
7 **Science Foundation Fellowship for the first three years.**
8 **And then I was fortunate to get an IBM Graduate Fellowship**
9 **for another year. And also had an IEEE Communication**
10 **Society Scholarship for one of the years.**
11 **Q. What was the subject matter of your Ph.D. research**
12 **while you were at Stanford?**
13 **A. I was focused on a particular technique for**
14 **transmitting bits over media. My particular research was in**
15 **trying to use this technique which you've heard about a**
16 **little bit in this trial already. It's called discrete**
17 **multitone modulation or DMT. I was looking at using that**
18 **technology to transfer data over a cable television network**
19 **from your home to the equivalent of the cable company**
20 **central office. That did not exist in the mid-'90s, and so**
21 **that's what I was looking at.**
22 **Q. How is this DMT technology related to DSL?**
23 **A. DMT is the -- basically fundamental technology that**
24 **underpins DSL. It's the -- it's the technique that actually**
25 **gets the bits from the transmitter to the receiver in either**

1 **direction.**
2 **Q. Who is your Ph.D. thesis advisor at Stanford?**
3 **A. His name is Dr. John Cioffi. He's actually best**
4 **known as the Father of DSL. He was the engineer who first**
5 **thought about using much wider bandwidth on the copper lines**
6 **that we all used to -- used to use to talk on the phone.**
7 **And he started looking at that in, I think, the late '80s**
8 **and had a very pivotal role in the standardization and**
9 **eventual adoption of the technology. And specifically, the**
10 **DMT technology that I was referring to a moment ago.**
11 **He also has, I think, something like a hundred**
12 **patents to his name. He has published over 600 journal**
13 **papers and articles. He's won numerous awards for his**
14 **contributions to DSL. And he recently was nominated for a**
15 **National Medal of Technology and Innovation. He's the man.**
16 **Q. Now, did you work at all while you were getting your**
17 **Ph.D. at Stanford?**
18 **A. I did. The last two years I was working on my Ph.D.**
19 **I consulted for a company called Amati Communication**
20 **Corporation. And actually that was Dr. Cioffi's company**
21 **that he started to commercialize the DMT technology that he**
22 **and his students had been developing. So I consulted there**
23 **for two years while I was working on my Ph.D. I got to work**
24 **there one day a week.**
25 **Q. After you got your Ph.D. in 1996, what did you do**

1 **next?**
2 **A. I joined the Amati full-time. So I worked on the --**
3 **we had two sort of separate tracks, one was on ADSL, one was**
4 **on VDSL, and I was on the VDSL team. So I started working**
5 **full-time for Amati.**
6 **Q. How long did you work for Amati?**
7 **A. Amati was acquired by Texas Instruments in 1998. I**
8 **worked for Amati from right after I finished my Ph.D. to**
9 **through the acquisition and through to May of 2004.**
10 **Q. Can you describe briefly for the members of the jury**
11 **what type of products you worked on or developed while you**
12 **were at Amati?**
13 **A. Sure. At Amati, like I said, I was on the VDSL team**
14 **and we developed a solution that would allow transmission of**
15 **I believe it would be 52 megabytes per second total, and we**
16 **had a way of being able to split that 52 megabytes in pretty**
17 **flexible ways between the direction from the central office**
18 **from the subscriber and the reverse direction, we could do**
19 **symmetric which is when the two data rates are equal and**
20 **then we could do highly asymmetric where we would transmit**
21 **eight times as much data downstream toward the subscriber**
22 **than upstream.**
23 **Q. During this same time, Dr. Jacobsen, had the VDSL2**
24 **standard been standardized yet when you were doing this work**
25 **at Amati?**

1 **A. No, the VDSL2 work didn't actually start until I**
2 **believe it was 2003ish when the work began and the**
3 **standardization organization.**
4 **Q. Now --**
5 **A. Can I just add. My answer was limited to VDSL2. I**
6 **believe you asked about VDSL2, yes.**
7 **Q. I did. You heard my question correctly.**
8 **A. Okay. Thank you.**
9 **Q. Now, describe briefly for the members of the jury**
10 **what your work was at Texas Instruments after Texas**
11 **Instruments acquired Amati?**
12 **A. Sure. For the first few years, my work didn't change**
13 **a whole lot. Texas Instruments left us pretty much to**
14 **continue the work that we were doing. It was part of the**
15 **reason that they had acquired the company. So I kept**
16 **working on VDSL largely. Eventually, I think around 2002, I**
17 **transitioned over to an ADSL role and managed one of our**
18 **product development efforts on the ADSL side. TI had**
19 **decided that because there was a little bit of a fight in**
20 **VDSL in the early days where there were two camps lined up**
21 **regarding the fundamental way of transmitting the bits and**
22 **one was the DMT camp which was the camp that we were in, and**
23 **the other was the single carrier camp. And there were a lot**
24 **of companies on both sides and there was a lot of fighting**
25 **at the standardization organizations, so there was no**

1 **decision on that.**
2 **And TI finally just said, this is not going to**
3 **be a profitable business for a little while, so they**
4 **transitioned most of us to ADSL.**
5 **Q. You used two terms in that answer. I want to ask you**
6 **to clarify. First who is TI?**
7 **A. I'm sorry. Texas Instruments.**
8 **Q. You refer to them sometimes as TI?**
9 **A. I do. I can't help it. Habit. I'll try not to.**
10 **Q. You also mentioned standards organizations. The jury**
11 **has heard quite a bit about standards organizations, but can**
12 **you describe briefly what a standards organization is?**
13 **A. Sure. It's an organization, a body where interested**
14 **parties, engineers usually from all kinds of different**
15 **companies will meet regularly to discuss how to do**
16 **something, how to make a product that can interoperate with**
17 **another company's product. And it's a really interesting**
18 **dynamic because you're in a room with your competitors, and**
19 **your potential customers depending on who you are, so it's a**
20 **strange sort of environment because companies are proposing**
21 **solutions, or aspects of solutions in front of their**
22 **competitors. But everyone who is interested in that space**
23 **typically participates in the standardization organization**
24 **in some way, either by actively contributing ideas or by**
25 **monitoring and watching.**

1 **Q. Can you describe for the members of the jury your**
2 **involvement in the standard setting organization for the DSL**
3 **standards?**
4 **A. Sure. I started participating in DSL standards**
5 **organizations pretty much right after I joined Amati in**
6 **1996. I attended regularly the North American groups**
7 **meetings. I also attended the counterpart European**
8 **organization meetings. And at all of these meetings, it was**
9 **the same kind of organizations where you would have people**
10 **bring in ideas and discuss, and typically they would meet**
11 **for about a week.**
12 **Starting in about the year 2000, I started**
13 **attending the organization called the ITU which is the one**
14 **that developed the VDSL2 standard that we have been talking**
15 **about this week. That organization develops what it calls**
16 **recommendations, but they're just standards. And they are**
17 **applicable to all jurisdictions in the world. And so that**
18 **became the group that kind of took over much of VDSL**
19 **standardization. So I attended those meetings from**
20 **essentially 1996 through roughly fault much 2006.**
21 **Q. Did you ever see Mr. Tzannes at any of the ITU**
22 **standards meetings?**
23 **A. Yes.**
24 **Q. What did you do after you left Texas Instruments?**
25 **A. After I left Texas Instruments, I started my own**

1 **business to do consulting on things in which I could help**
2 **such as DSL standardization, product strategy, that sort of**
3 **thing.**
4 **Q. Have you ever done any work for 2Wire?**
5 **A. Yes.**
6 **Q. Can you describe briefly for the members of the jury,**
7 **please, your work for 2Wire?**
8 **A. When I had left TI, one of my friends from TI --**
9 **sorry, Texas Instruments, hard habit to break. My friend,**
10 **Doug, had been at Texas Instruments with me. We had worked**
11 **together. He had gone to 2Wire, and when he got there, he**
12 **realized that 2Wire had not been participating in ITU**
13 **meetings and that they probably should. And so I was asked**
14 **if I would come on as a consultant to help 2Wire integrate**
15 **their, some of their people into the ITU meetings and help**
16 **them learn the ropes and kind of mentor them in getting**
17 **involved in standardization.**
18 **Q. Did you ever do any work for 2Wire on any DSL modems?**
19 **A. I did not.**
20 **Q. I'm sorry if you said this already, how long did you**
21 **represent 2Wire at the standards body?**
22 **A. From about late summer of 2004 to summer of 2006.**
23 **Q. Thank you, Dr. Jacobsen.**
24 **Have you published any books relating to DSL**
25 **technology?**

598 1 A. Yes, I have. 2 Q. Can you describe that for the members of the jury? 3 A. I can show you. These are the two books. This is 4 The Fundamentals of DSL Technology. I co-edited with two of 5 my colleagues who I actually met through the standards 6 bodies. I wrote Chapter 7. And then also somebody had to 7 go through and read it and sort of make it sound like one 8 person wrote it so that we wouldn't have that weird 9 disjointed presentation of materials, so I was the one that 10 did that. 11 The second book, this is published in 2006. I 12 don't know if I told you that. 13 The second book was the Implementation and 14 Applications of DSL Technology. This one came out in 2008. 15 This one I co-wrote chapter 17, which is on DSL 16 standardization with several other colleagues who were also 17 involved in the standards meeting. And again, I was the 18 lucky person who got to read the whole thing and edit it and 19 make sure it sounded like one person had written it. 20 Q. Did you make a dedication in the first book? 21 A. I did, yes. 22 Q. Can you read it for the members of the jury? 23 A. Sure. It says, "Krista Jacobsen dedicates this book 24 to John Cioffi who arguably started it all." 25 Q. Are you an inventor on any patents?	600 1 Q. Have you prepared any slides summarizing those 2 opinions? 3 A. I have. 4 MR. SCHUMAN: Your Honor, permission to publish 5 the slides. 6 THE COURT: Sure. 7 BY MR. SCHUMAN: 8 Q. Dr. Jacobsen, can you summarize for the members of 9 the jury what your opinions are regarding the issues in this 10 case? 11 A. Sure. 12 The first opinion is that the 2Wire accused 13 products do not infringe the three patents, the asserted 14 claims of the three patents. That's claim 5 of the '381 15 patent, claim 13 of the '882 patent, and claim 1 of the '048 16 patent. 17 I also concluded that the claims in the patents 18 are obvious. And finally, I concluded that the certificates 19 of correction don't simply correct typographical errors, 20 they actually make a substantive change. And the person 21 having ordinary skill in the art would have understood the 22 patents as they originally issued. 23 Q. Now, before we dive into each of these opinions, I 24 want to take a step back and talk a little bit more about 25 the underlying DSL technology. Can you please briefly
599 1 A. Yes. I believe I have eleven patents where I'm named 2 as an inventor. 3 Q. Generally what's the technical subject matter of 4 those patents? 5 A. They are all related to digital communications. 6 Almost all of them, in fact maybe all of them are related to 7 DMT technology. And probably half of them are DSL specific 8 and the other half are more on multiaccess kind of 9 technologies. 10 Q. Approximately how much of your professional life have 11 you have spent dealing with DSL technology? 12 A. I would say probably at least fifteen years. 13 Q. Are you being paid for your time here today? 14 A. Yes, I am. 15 Q. Does the compensation depend in any way on your 16 opinions here today? 17 A. It does not. 18 MR. SCHUMAN: Your Honor, I would like to offer 19 Dr. Jacobsen as an expert in the subject matter of DSL 20 technology. 21 THE COURT: All right. You may proceed. 22 BY MR. SCHUMAN: 23 Q. Have you formed any opinions, Dr. Jacobsen, relating 24 to the issues in this case? 25 A. Yes, I have.	601 1 explain for the members of the jury what DSL is? 2 A. Yes. And I apologize for repeating some of this 3 material, but I have some disagreements with what you have 4 previously heard. And for me, it helps to go over things 5 multiple times, so maybe it helps you as well. 6 So DSL as you have heard uses the already 7 installed copper telephone lines that were installed for the 8 purposes of carrying telephone signals. The data is 9 provided to a server. So the server over here has the data 10 coming in from the internet, it then gets transmitted in 11 both directions over the plain old telephone system and we 12 have a modem in the home, and the beauty of DSL at the time 13 that it was invented was that you could actually talk on the 14 phone at the same time you used your modem, which was crazy, 15 because everyone remembers dial ups probably and how 16 annoying that was that you couldn't make phone calls at the 17 same time. DSL solved that problem and also provided for 18 large amounts of data to be able to go in both directions. 19 Q. Now, Dr. Jacobsen, what is interleaver and how is it 20 related to DSL technology? 21 A. Well, I prepared a slide. And as we've heard and you 22 might just expect anyway, any time you're communicating over 23 a channel, there is potential for the data that's being 24 transmitted to be corrupted by noise. So in DSL, we use 25 this technique that you heard of called forward error

1 correction. And we take a chunk of data to be transmitted,
2 in the case of DSL it's always referred to in bytes, you
3 take a certain number of bytes, and then we add an error
4 correcting code at the end. And it's just some bytes that
5 help reconstruct the data if it's, in fact, harmed during
6 transmission.

7 So I'll show you what happens before we use
8 interleaver to explain why interleaver is used and has been
9 used in DSL since the beginning. So if we just line up our
10 data without interleaving, and we transmit it over the
11 channel, and we get a burst of noise, we can have multiple
12 adjacent bits or bytes that are corrupted by the noise. And
13 these error checking codes can only correct so many errors.
14 If there are too many errors, then they can't correct all of
15 the errors.

16 And so we want to make sure that we design the
17 system so that if there are errors, the error correcting
18 code can go ahead and correct them. So if we don't have
19 interleaving, we might have a scenario where the error
20 correction code can't fix all of the remaining errors in the
21 data.

22 So in this case, we lose the bytes that were
23 labeled previously B2 and B3. So we've lost some data that
24 could show up as a hiccup in a video, or it could just be,
25 you know, failure of some kind of information that was

1 coming down. So to try to mitigate that, we employ a
2 technique called interleaving.

3 And I'm going to show you a graphic, a very
4 simple interleaving scheme that's called block interleaving
5 just to give you a sense of what's happening. Instead of
6 transmitting the bytes in the natural order in which they
7 came out of the forward error correcting code circuit, we
8 are going to shuffle them in deterministic no way. So
9 instead of transmitting A1 and A2 together, we interleave
10 them. So we shuffle them.

11 Mr. Schuman calls it scrambling, but you're
12 going to mix up the order in a way that you know, and you
13 cannot do in the receiver. So we apply the interleaving,
14 and then we go ahead and transmit the data over the line.
15 And if we have that same noise burst that we had previously,
16 we're still going to have two adjacent bytes in this example
17 corrupted.

18 But now when we go and put it back together in
19 the receiver, those errors are now spread between the first
20 code word and the last code word. That's the term for data
21 bytes plus the error correcting code bytes. So now we've
22 got enough power to actually allow the forward error
23 correcting code to correct those errors. So it fixes them
24 like magic. Everything is back to normal, and we don't have
25 any residual errors.

1 Q. Thank you, Dr. Jacobsen. During the course of the
2 trial we've heard a couple of letters, D and I. Can you
3 please explain for the members of the jury how D and I are
4 related to interleaving?

5 A. Sure. And I'll just continue with the example that I
6 just showed you. There's a sort of fundamental unit of an
7 interleaver called the block length, and that is given the
8 letter I. In the case that I have here, there are four
9 elements over which the interleaver operates.

10 And then there's the interleaver depth. So the
11 interleaver depth, the way to think about it is that it's
12 the -- if I have two elements or two bytes that are adjacent
13 to each other, before I have interleaved, the interleaver
14 depth is how far apart are they from each other once I've
15 interleaved. That's all the depth is.

16 And so you can see here, I've got an interleaver
17 depth of three. There are three elements from each other.

18 Q. All right. We talked also a lot about delay during
19 this trial. How is interleaving and deinterleaving related
20 to delay?

21 A. Well, again, I'll show you the difference by showing
22 you what happens without interleaving first, and then we'll
23 talk about what happens with interleaving. So without
24 interleaving, there's still a little bit of a delay because
25 the transmitter has to collect in our example, in the

1 example I've shown here, three bytes. It has to add an
2 error correction byte which is referred to as the FEC byte.
3 And then it transmits those four bytes in sequence to the
4 transmitter delay.

5 There is still a delay, but it's pretty short
6 because the receiver only has to wait for four of the bytes
7 before it can perform the error correction and send those
8 bytes over to whatever the destination is. Here, I'm
9 showing just a computer monitor. So there's still a delay,
10 but it's pretty small. And it's only due to the fact that
11 we have to collect from this entire block before we can
12 perform the error correction.

13 Now, with interleaving, we've got much more of a
14 delay because now the transmitter has to collect more bytes
15 before it can send the entirety of any of these blocks to
16 the receiver. So likewise, the receiver has to wait longer
17 while it's receiving them. And you can see it's just taking
18 longer for everything to get there.

19 Once this last error correcting byte gets there,
20 we can send block A to the destination. And then we can get
21 block B, send it to the destination. So the upshot of this
22 is we need to have some memory in the transmitter, and in
23 the receiver. In the transmitter to store the bytes while
24 they're being shuffled or interleaved, and in the receiver,
25 so that the deinterleaver can unshuffle the bytes and

606 1 deliver them to the destination. 2 So we've got to have some amount of memory 3 available to store the bytes while they're being interleaved 4 and deinterleaved. 5 Q. Dr. Jacobsen, you were in the courtroom when 6 Dr. Cooklev testified yesterday; right? 7 A. Yes, I was. 8 Q. And did you hear Dr. Cooklev testify that the memory 9 on the central office end has to be equal or identical to 10 the memory on the modem end or the CPE end? Did you hear 11 that testimony? 12 A. I did hear that. 13 Q. Do you have an opinion regarding that testimony? 14 A. I do. I totally disagree. 15 Q. Can you explain your opinion to the members of the 16 jury, please? 17 A. So there's a difference between the parameters I and 18 D and their values. Those do have to be the same between 19 the interleaver and the deinterleaver, but the amount of 20 memory that they use to implement the I and D values is 21 completely up to the implementer. There's a minimum amount 22 of memory that has to be provided. 23 Theoretically, there is a minimum. So there's 24 no way that to provide less memory than that. But there's 25 no reason why an implementation couldn't provide more memory	608 1 delay, either one of them has to have I minus one times D 2 minus one divided by two octets or more. So that's the 3 minimum amount of memory. 4 And I do want to also pause here and try to make 5 clear the difference between delay and memory because it is 6 different, and it's an important difference, especially in 7 the context of these patents. If you remember Dr. Cooklev's 8 animation from yesterday, he showed what happens to the 9 different bytes of a code word as they go through the 10 interleaver and the deinterleaver. And he showed you that 11 the first byte of the code word is not delayed at all in the 12 interleaver. It flies right out, and it goes, and it sits 13 in the deinterleaver. 14 And in contrast, the last byte spends a ton of 15 time in the interleaver. And then when it goes over the 16 channel and hits the deinterleaver, it goes right out. So 17 the bytes all suffer the same total amount of delay, but 18 they spend a different amount of time in the interleaver 19 than they do in the deinterleaver. 20 All of the bytes have the same total delay, but 21 they spend it in different locations. So that's one of the 22 differences between delay and memory. And then Dr. Cooklev 23 also said yesterday -- I think I heard him say that the 24 delay is always measured in time, and that's not true. 25 And one reason is exactly here all of us who
607 1 than that to do the interleaving and deinterleaving. 2 Q. Thank you. Let's move on to another phrase that I 3 think the jury has heard, convolutional interleaving. 4 A. Yes. 5 Q. What is convolutional interleaving? 6 A. Okay. Convolutional interleaving is the type of 7 interleaving that DSL has defined since the first standard 8 which was in the mid-'90s. 9 As you can see, when you compare it to the block 10 interleaving that I showed you in the examples, it's quite a 11 bit more complicated. Look, it's actually not that 12 complicated, but it doesn't look so pretty. 13 This is what it looked like. Dr. Cooklev 14 actually had his animation where he showed it working in 15 practice. You don't really need to understand the details 16 of how convolutional interleaving works. 17 The two key things to understand are that 18 there's a delay caused by convolutional interleaving, and 19 that delay is characterized by the interleaver block length 20 I minus one times the interleaver depth, D minus one. That 21 product in octets, which as Dr. Cooklev explained octets are 22 just bytes. So just I don't know why, but we characterize 23 delay sometimes in octets. 24 And the minimum amount of memory that's needed 25 for an interleaver and a deinterleaver to provide that	609 1 were writing the VDSL2 standard, we know the difference 2 between delay and memory, and we specify delay. So from 3 that alone, delay is not always measured in time. 4 But a real-world example is when you arrive here 5 in the morning and you're standing in the security line. 6 What do you do? Everyone looks, how many people are in 7 front of me? You measure your delay in terms of the number 8 of people in front of you. You're not necessarily measuring 9 your delay in terms of time, right. 10 So even in ordinary life, we measure delay in 11 units other than time. So I wanted to make sure I brought 12 that out. 13 Q. Thank you, Dr. Jacobsen. How long has this 14 convolutional interleaving technology that we've been 15 talking about been around for? 16 A. Well, as I said, it's been around since the very 17 first ADSL standard which was released in 1995. It's also 18 been incorporated in every additional ADSL and VDSL standard 19 that's been developed since so it's old, well known, and 20 always used in ADSL and VDSL. 21 Q. Can you explain for the members of the jury please 22 what shared memory is in this context? 23 A. Well, the Court has construed the term shared memory, 24 and it's common memory used by at least two functions where 25 a portion of the memory can be used by either one of the

610 1 functions. 2 So the easiest way to understand shared memory 3 is to contrast it with the only other way that you can do 4 this which would be with dedicated memory. So on the left 5 here, I've got a figure that shows a dedicated memory 6 approach. And there you have a block of memory that is 7 always and forever devoted to the interleaver. 8 And you have a separate block of memory that is 9 always and forever associated with the deinterleaver and 10 available to the deinterleaver. If you have a shared memory 11 approach, instead what you do, if I can make my pointer 12 work, is there's a single block of memory. And this 13 boundary here between the interleaver and deinterleaver can 14 move according to the Court's construction. 15 And I would -- I will emphasize that the Court's 16 construction doesn't actually require the shared memory to 17 be shared between an interleaver and a deinterleaver. I'm 18 showing that in my diagrams simply because that's what the 19 patent claims require. But the Court's construction is 20 actually more general than that, just to functions. 21 Q. Was shared memory, as the Court has defined it, known 22 prior to the date of TQ Delta's patents? 23 A. Absolutely, yes. 24 Q. Can you explain? 25 A. For example, one reference, and I will talk to you	612 1 summarizing the bases for your disagreements with 2 Dr. Cooklev regarding whether these 2Wire products infringe 3 the TQ Delta patents? 4 A. Yes, I did. And what I did was first understand what 5 Dr. Cooklev needed to show in order to prove that the 6 accused products infringe. And he had to prove that each of 7 the elements of the claims are performed by or practiced by 8 the accused products. 9 So I started with the standard, and then I 10 concluded that, among other things, the accused products do 11 not receive -- and the wording here is foreign, so I will 12 emphasize it here. The claims require a message during 13 initialization specifying a maximum number of bytes of 14 memory that are available to be allocated to an interleaver 15 or deinterleaver. 16 And you've heard about the O-PMS message, and I 17 will talk more about it, but it does not have that. And so 18 on that basis, the accused products do not receive that 19 message that's required by all of the claims. 20 I also looked at Dr. Cooklev's testing results, 21 and I don't disagree with his results, but I disagree with 22 how he has interpreted his result responsibility. His 23 results merely show compliance with certain aspects of the 24 standard. They don't show that there's infringement. 25 Again, the standard itself doesn't require infringement.
611 1 more about this reference, is called the Mazzoni patent. 2 This was a patent that was actually considering the use of 3 shared memory in a VDSL system for interleaving and 4 deinterleaving. 5 This patent, and we'll talk more about it, I've 6 pulled out Figure 6 from this patent, and I've annotated 7 with some colors here and a bubble. But the top part in 8 blue is the portion -- is the interleaver, and then the part 9 in pink is the deinterleaver. And there's a shared memory 10 block labeled MM where part of it has been allocated to this 11 interleaver and part has been allocated to the 12 deinterleaver. 13 So that's one reference, and we'll talk more 14 about this a bit more. And another couple of references are 15 the Berkman patent and the Kang patent. The Berkman 16 patent describes a data memory for temporary storage of the 17 data to be interleaved and deinterleaved. 18 And the Kang patent describes a double buffering 19 procedure that allows the channel interleaver memory to be 20 used also as deinterleaver memory. So those are a few 21 references that I found that show shared memory well before 22 the patents' priority date. 23 Q. Let's switch gears, again, Dr. Jacobsen, back to your 24 non-infringement opinions. Let's dig a little more into 25 your non-infringement opinion. Did you prepare a slide	613 1 Q. Let's dig a little more into the second bullet on the 2 slide, your opinion regarding the O-PMS message. 3 A. Right. I have prepared a slide here. Again, the 4 accused products do not have and do not receive a message 5 during initialization specifying a maximum number of bytes 6 of memory that are available to be allocated to an 7 interleaver or a deinterleaver. 8 And just to be clear, I've merged the two kinds 9 of messages from the two claims. One, I think it's the 10 '048, says the interleaver. And then the other two say 11 deinterleaver, but I've merged them in my quotation here. 12 We just don't have that. So the '048, the '882, 13 and the '381, they all require this message specifying a 14 maximum number of bytes of memory are available to be 15 allocated to a interleaver or deinterleaver. We don't have 16 that. 17 Q. Can you describe your opinion regarding what the 18 O-PMS message does and doesn't have for the members of the 19 jury, please? 20 A. Yes. Well, it doesn't specify a maximum amount of 21 memory. What O-PMS describes -- first of all, it has a 22 bunch of fields. I have my -- oh, there you go. 23 Okay. So we have a bunch of fields here in this 24 O-PMS message. You can see there's 16 fields. None of 25 these fields specify a maximum amount of memory available to

614 1 be allocated to an interleaver or a deinterleaver at the 2 customer's premises equipment side. 3 So I'll back up here. So we don't have a 4 maximum amount of memory specified. It specifies in the max 5 delay octet values a maximum delay. And as we talked about, 6 delay is not the same as memory. 7 So what the delay specifies is a minimum amount 8 of memory that needs to be allocated. So delay and memory 9 are not the same, as I said. We all -- all of us who are 10 developing the VDSL2 standard understood that there's a 11 difference between delay and memory. We could have said 12 memory. We said delay, and we did it purposely. And we did 13 it so that people could implement the standard however they 14 felt was best. 15 If they wanted to use more memory, knock 16 yourself out. If they wanted to use less memory, as long as 17 they met the minimum requirement, people could do that. So 18 delay and memory are not the same. 19 And then specifying a minimum amount of memory 20 is not the same as specifying a maximum amount of memory. 21 So the O-PMS message does not meet the message limitation of 22 the claims. And I also -- yeah, here's our description of 23 O-PMS, is the max_delay_octets. 24 Just by its name, it says maximum delay. It 25 doesn't say maximum memory.	616 1 sentence actually means. So again, the sentence says that 2 the O-PMS message specifies the portion of shared interleave 3 memory that the VTU-R can use to deinterleave the downstream 4 data streams. 5 So first of all, as Dr. Cooklev I believe agrees 6 with me, the VSDL standard does not require the shared 7 memory. It doesn't require the use of shared memory. Why 8 would it say something about shared memory here? 9 The way that the initialization scheme works 10 typically in DSL standard is that one transceiver will send 11 a message to the transceiver on the other side of the line, 12 it will then reply with some other kind of message, so it's 13 a what we call half duplex kind of an operation. 14 The O-PMS message is the first message with 15 certain kinds of information. And it always comes from the 16 central office side first. 17 The central office side gets to tell the 18 subscriber modem these are the values of I and D that I want 19 you to use when you are communicating with me. So when 20 you're transmitting, set up your interleaver so that you use 21 this value of I and this value of D. Those values are sent 22 in the O-PMS message. They're actually in this LP0 and LP1 23 fields depending on how many latency paths we have. We can 24 have up to two. Are however many we have, for each of them 25 we will have a value of I and a value of D, and the central
615 1 Q. Can I pause you there for a second, Dr. Jacobsen. 2 Dr. Cooklev yesterday said because it's specified in bytes 3 that means that it's memory and not delay. Do you have an 4 opinion on that subject? 5 A. Yes. And I disagree. I disagree. 6 Q. Explain that to the members of the jury, please. 7 A. Well, as we talked about, just because something has 8 units -- just because something doesn't have units that you 9 might think about, for example, seconds for delay doesn't 10 mean that it somehow transforms into something else. 11 Delay can be measured in octet. It can be 12 measured in time. One of the reasons to specify it in 13 octets is because if we wanted to specify it in time, we 14 would need to know the bit rate. Because the rate -- the 15 delay is going to depend on how quickly those bits are 16 coming into the interleaver and going over the line and 17 leaving the deinterleaver, and so we -- so if we wanted to 18 know time, we would also need to know the bit rate. So to 19 remove the bit rate from the analysis we can refer to delay 20 only in terms of octets or bytes. 21 Q. Let's turn to slide 25, please. Dr. Jacobsen, you 22 highlighted on your slide -- you've highlighted a sentence 23 here. Why did you highlight that sentence? 24 A. Well, Mr. McAndrews highlighted the sentence in his 25 opening statement and I wanted to explain to you what that	617 1 office site dictates it to the CPE, the customer premises 2 equipment. 3 So the subscriber side modem receives that 4 information, and then it says okay, I need to support this I 5 and this D. It's going to do whatever it's going to do to 6 figure out how much memory it needs and to actually allocate 7 that memory. But it's going to do whatever it's going to do 8 and the central office transceiver has no idea how it's 9 doing this. 10 Once it's figured that out, in the case that it 11 is actually using a shared memory, it knows what it has left 12 over that would be available, that would be the portion of 13 the downstream -- sorry, of the shared memory that it could 14 use then for its own interleaving. 15 So my opinion is that this sentence here is not 16 tied at all to these max_octet values. It is referring 17 instead to the transmission of the I and D values for use in 18 the upstream direction which again, was done well before any 19 of this. The central office side always tells the customer 20 premises side which values of I and D to use in the upstream 21 direction. That's been done since the beginning of DSL. So 22 that's a very old feature. 23 And I think this note was just intended to tell 24 the reader that if shared memory is being used, that once 25 the O-PMS message has been received and the values of I and

618 1 D are known, then the customer premises equipment can figure 2 out how much memory it has left over for its own 3 deinterleaver. 4 Q. Does the central office ever tell the modem in your 5 home how much memory to use for either interleaver or 6 deinterleaver? 7 A. It doesn't. It tells it I and D values for use in 8 the upstream direction, and those I and D values then tell 9 the transceiver the minimum amount of memory it needs. It 10 actually already knows how much memory it needs because it's 11 going to allocate memory however it does it. It's been 12 designed to do it, but it's going to do it in a way that 13 supports the values of I and D that it was given. 14 Q. Going the other direction, Dr. Jacobsen, after the 15 CPU, the modem in your home determines and allocates a 16 shared memory if it's using a secured memory between 17 interleaver and deinterleaver, does it report that 18 information back to the central office? 19 A. No, it doesn't. There is no way for the central 20 office to know how much memory the subscriber unit is 21 actually using, either for interleaver or de-interleaving. 22 It's going to know that it's using at least some amount, but 23 it doesn't know how much it's actually using. 24 Q. Why doesn't the standard require the CPU, the modem 25 in your home to report back to the central office the amount	620 1 specify the requirement in terms of delay which then 2 translates into a minimum amount of memory, and then we 3 explicitly said the amount of memory that an implementation 4 actually uses is implementation specific, which means your 5 choice as long as you got this minimum which at least delay 6 octet which is I minus 1 times D minus 1 divided by 2. As 7 long as you meet that, the amount of memory that you 8 actually use, totally up to you. 9 Q. Dr. Jacobsen, are there reasons why a CPE or a modem 10 in your home may want to use more than the minimum amount of 11 memory required for either interleaving or de-interleaving? 12 A. Sure. First of all, you can have a much more 13 flexible design if you have more interleaver memory 14 available. Sometimes you might want to leave a little bit 15 of headroom for your interleaver or your deinterleaver in 16 case something elsewhere in the signal processing chain, 17 somewhere behind or ahead is maybe not going to be able to 18 do things as quickly as you thought. Yeah, there are 19 reasons why you would use more memory. 20 Q. Let's shift gears slightly and turn to your opinion 21 regarding Dr. Cooklev's infringement test. Did you prepare 22 a slide? 23 A. I did. 24 Q. Can you describe for the members of the jury your 25 opinion in response to Dr. Cooklev's test?
619 1 of memory being used for interleaving and de-interleaving? 2 A. Well, typically the transceivers are only going to 3 communicate information that the other side needs to know. 4 And the central office has no interest in knowing how much 5 memory the customer equipment is using. It's not something 6 that it cares about. All it cares about is that the 7 subscriber side modem is using the proper values of I and D 8 that the central office side sent over. So it doesn't need 9 to know it and it won't be the kind of thing that would be 10 communicated. 11 Q. Dr. Jacobsen, what does the phrase implementation 12 specific mean in the context of the VDSL2 standard? 13 A. Well, as I mentioned, the objective of a standard is 14 to specify a minimum set of requirements that will ensure, 15 hopefully that a transceiver made by one company will 16 communicate properly with a transceiver made by another 17 company. And how you do that is in many ways left 18 completely up in the air, and open to however the 19 implementer chooses to implement it. 20 And so typically we specify only a minimum set 21 of requirements and then say the implementers can do -- can 22 implement however they want as long as the two pieces of 23 equipment will interoperate. 24 And so in the context of interleaver memory, 25 what the standard does, and this was deliberate, was to	621 1 A. Yes. As I said previously in my summary slide, the 2 tests do not show infringement. And the reason is that as 3 we were just discussing, they don't show how much memory the 4 subscriber side equipment is actually using for interleaving 5 or de-interleaving. So that's one reason. 6 But more fundamentally the O-PMS message does 7 not specify a maximum number of bytes of memory available to 8 be allocated to an interleaver or deinterleaver of the CPE. 9 Sorry, the customer premises equipment. 10 So all Dr. Cooklev's testing shows is yes, the 11 transceivers received the O-PMS message, they have to 12 according to the standard. And again, the standard does not 13 require shared memory. So all VDSL2 transceivers receive 14 the O-PMS message. Likewise, all VDSL2 transceivers will 15 send, at the customer side will send the R-PMS message back, 16 because again, it's required by the standard. 17 So what Dr. Cooklev's test showed was yes, it 18 received the O-PMS message. Yes, it transmits the R-PMS 19 message. And yes, those messages do convey values of I and 20 D. But I and D don't tell you how much memory is actually 21 being used. They just tell you the delay and then from the 22 delay you can calculate a minimum amount of memory that the 23 transceiver must be using. 24 Q. So Dr. Jacobsen, do you recognize this as one of 25 Dr. Cooklev's slides from yesterday?

622 1 A. I do, yes. 2 Q. And yesterday, Dr. Cooklev said this slide shows that 3 the amount of memory never exceeds the amount in the column 4 marked max_delay_octet downstream divided by two, do you 5 remember that testimony? 6 A. I remember it. 7 Q. What is your opinion regarding that testimony? 8 A. Well, I don't agree. Because, again, the 9 max_delay_octet values are simply delays, so even if you cut 10 them in half, it's still not memory. It's still delay. And 11 the I minus 1 times D minus 1, that's also delay, and 12 dividing that by two, it's also delay. So it's comparing 13 here delay to delay and it's not surprising at all because 14 the max_delay_octet value specifies a maximum delay. But 15 it's a maximum delay which translates to a minimum amount of 16 memory. 17 And all that he's shown here is that the 18 transceivers at the customer side when they select the 19 values, I believe this is deinterleaver, deinterleaver, yes, 20 when they select these values for their deinterleaver and 21 then report them back to the central office so that it can 22 use them to configure the interleaver, all he's shown is 23 that they didn't violate this requirement sent down by the 24 central office, so it just shows that yep, I picked I and D 25 values according to the requirement that you gave me. It	624 1 knew the difference, we used delay. They're not memory. 2 Third, the max_delay_octet values can affect the 3 minimum amounts of memory, but they don't establish a 4 maximum. And it's because of the fact that the minimum 5 amount of memory required to meet the delay is part of the 6 delay value. 7 And finally, TQ Delta's tests don't and can't 8 show infringement because they just show compliance with the 9 standard and the direct transmission of the O-PMS, reception 10 of O-PMS and transmission of R-PMS. 11 Q. Let's switch gears to your opinion regarding the 12 validity of the asserted patents. LB-031, that's one of the 13 pieces of prior art that you talk about in your invalidity 14 opinion; right? 15 A. That's correct. 16 Q. Now, turn to the next slide. Can you describe very 17 briefly what LB-031 is? 18 A. Sure. So LB-031 is what's called a contribution to 19 the ITU standards group that was actually working on the 20 VDSL2 standards. So it was the -- a paper submitted to the 21 group as something to consider during the development of the 22 VDSL2. 23 And just to step back for a second. The way 24 that standards bodies operate is these companies and people 25 who are participating in order to provide their ideas to the
623 1 doesn't tell you how much memory they're actually using. 2 So I put on Dr. Cooklev's slide. 3 Q. Dr. Jacobsen, other than what you have testified to 4 already, did you consider any other evidence or information 5 in forming your opinions regarding whether any of the 6 accused products infringe? 7 A. I did. I considered Dr. Walker's analysis. 8 Q. How did Dr. Walker's analysis factor in your opinion? 9 A. Well, Dr. Walker's analysis was completely consistent 10 with what I expected, which is that the determination of 11 allocation of memory does not rely on these max_delay_octet 12 values that TQ Delta has identified. 13 Q. Before I move on to another topic in the case, did 14 you prepare any slides summarizing your opinions regarding 15 the infringement issue in the case? 16 A. I did, yes. 17 Firstly, I concluded that the VDSL2 standard 18 itself does not require shared memory. It contemplates the 19 use of shared memory, but it does not require it. 20 Implementers are free to implement however they want as long 21 as they meet the requirements including the delay 22 requirement. 23 Also, as I explained, the max_delay_octet values 24 do not specify the maximum amount of memory. They specify 25 maximum delay, and delay and memory are not the same. We	625 1 standards group, they submit what's known as a contribution, 2 and it's always a written document. This is the format that 3 the contributions that the group that developed VDSL2 looked 4 like. 5 This contribution was submitted in June of 2004 6 for the meeting that was held in Leuven, Belgium. It's 7 directed to the VDSL2 project. It's actually called 8 Constraining the Interleaver Complexity. It was written by 9 Cory Modlin from Texas Instruments, one of my former 10 colleagues, actually. 11 Q. Were you attending the ITU study group's meetings 12 around the VDSL2 around this time? 13 A. Yes, I attended pretty much consistently from 2000 14 through as I said, about fall of 2006. 15 Q. You were in the courtroom when Mr. Tzannes testified 16 on the first day of this trial? 17 A. I was. 18 Q. He was asked and confirmed that he attended a meeting 19 in Leuven, Belgium. Do you know whether that was the same 20 meeting that this piece of prior art was contributed? 21 A. I believe so. This was the only Leuven meeting of 22 this group to my knowledge. 23 Q. Can you describe for the members of the jury the 24 subject matter of LB-031? 25 A. Sure.

626 1 So LB-031 was concerned with how to affect or 2 how to constrain the complexity which is a standards buzz 3 word for cost of the interleaver that would be needed for 4 VDSL2. And the reason for this is that unlike previously 5 developed DSL standards, VDSL was not intended just to be an 6 asymmetrical type of service or a symmetrical service. 7 Previous VDSLs had either been symmetric or asymmetric. In 8 other words, a lot of data to the subscriber and not much 9 coming out or equal. 10 And typically the ones that were symmetric were 11 for consumers, thinking that you would downloading more than 12 uploading. The asymmetric ones were for businesses who had 13 more data to go in both directions. VDSL was the first 14 standard to be considered to be something that you could use 15 for either type of application. 16 So there from the very beginning were 17 discussions about service provider requirements and service 18 providers wanted to have the ability to offer all kinds of 19 services, symmetric, asymmetric, some of them wanted very 20 high bit rates, some of them wanted more modest bit rates, 21 so the requirements were kind of all over the map. And 22 LB-031 was presented in that context. It's describing how 23 to use a messaging scheme to allow different transceivers 24 made by different companies, probably, to communicate their 25 interleaving requirements and capabilities to each other	628 1 that were known, but we'll go through the contribution 2 itself. 3 Q. Let's start with the gray shaded row at the top. 4 We've had lawyers call this the preamble. What is your 5 opinion regarding LB-031 and the preamble of each of these 6 three patent claims? 7 A. My opinion is that the preamble is disclosed. 8 MR. MCANDREWS: Your Honor, objection. 9 THE COURT: Can I see counsel at side-bar. 10 (Side-bar discussion:) 11 THE COURT: I thought this was what was 12 represented that she was not going to say. 13 MR. SCHUMAN: My question is what is your 14 opinion regarding, I didn't ask the question, my question 15 was fine. I think your objection is what came out of her 16 mouth. 17 MR. MCANDREWS: It's an undisclosed opinion and 18 it's not consistent with your rulings, Your Honor. 19 MR. SCHUMAN: So my question was what is your 20 opinion regarding the relation between LB-031 and the patent 21 claims and she's going to go through exactly the opinion. I 22 hope she does the opinion that I represented to the Court 23 this morning. 24 THE COURT: But she just said, you just asked 25 her not about the whole thing, but about preamble, and she
627 1 during initialization so that they could negotiate 2 parameters for the interleaver and for the deinterleaver. 3 MR. SCHUMAN: Thank you, Your Honor. I move 4 LB-031, which is JTX 57 into evidence. 5 THE COURT: All right. No objection. There is 6 no objection, so it's admitted without objection. 7 MR. SCHUMAN: Thank you. 8 (JTX-57 was admitted into evidence.) 9 BY MR. SCHUMAN: 10 Q. Dr. Jacobsen, did you compare LB-031 to the elements 11 of TQ Delta asserted patent claims? 12 A. I did. 13 Q. And did you prepare a slide in that regard? 14 A. Yes, I did. It's an eye chart, but it's helpful 15 because we'll go through them all at the same time. 16 So yes, so we have claim 1 of the '048 on the 17 left, claim 13 of the '882 in the middle, and claim 5 of the 18 '381 on the right. 19 And before we start, I just want to remind the 20 jurors, and myself that as I explain, forward error 21 correction and interleaving were used in DSL since the 22 beginning. Convolutional was used since the beginning and a 23 lot of these steps just go to ordinary things that a DSL 24 modem did and always did. Things like Reed Solomon coding 25 and interleaving and de-interleaving, those are all things	629 1 just said LB-031 discloses shared memory, did she not? 2 MR. SCHUMAN: I think I heard the same thing 3 that the Court heard, but the objection is -- the objection 4 should be to my question, not to the answer. I have a few 5 more questions. She will explain her opinion. If 6 Mr. McAndrews has a problem with that answer, that's for 7 cross-examination. 8 THE COURT: But I don't think it really is in 9 the sense of, you know, you represented that she wouldn't 10 disclose that. I agree your question is vanilla. 11 MR. SCHUMAN: I only give the question, not the 12 answer. 13 THE COURT: But so what do you want me to do 14 about this? 15 MR. SCHUMAN: I can try to clarify it. 16 MR. MCANDREWS: If he can clarify it, I think 17 that would be okay. Although, I mean, saying it's disclosed 18 means it's expressly or inherently disclosed, that's clearly 19 not her opinion. 20 THE COURT: If you think you can clarify, and 21 feel free to use leading questions if that helps. Okay? 22 MR. SCHUMAN: Thank you, Your Honor. 23 THE COURT: All right. 24 BY MR. SCHUMAN: 25 Q. Dr. Jacobsen, is it your opinion that LB031 expressly

630 1 discloses the preamble of each of the three TQ Delta claims? 2 A. No, that is not my opinion. It does not use the 3 words shared memory explicitly. But as I explained 4 previously, there are only two ways to implement memory, 5 interleaving and deinterleaving memory. It's either a 6 dedicated or shared. 7 LB031 -- the LB031 contribution doesn't say 8 either way. So my opinion is that a person having ordinary 9 skill reading it would have understood it to apply to either 10 kind of implementation. 11 Q. When LB031 was contributed to the standards body in 12 June 2004, were there discussions going on at the standards 13 body about whether to use shared memory in VDSL? 14 A. Yes, there were. The discussions on whether to use 15 shared memory began immediately once folks realized the 16 breadth of requirements that the service providers had in 17 mind, and the fact that the product might need to be able to 18 do symmetrical and isometrical services. So my recollection 19 is that those discussions began -- 20 MR. MCANDREWS: Your Honor, objection. This 21 is -- 22 THE COURT: I'm sorry. Sorry, members of the 23 jury. 24 Can I see you at side-bar? 25 (Beginning of conference held at side-bar:)	632 1 might apply when you don't have a specific reference to 2 shared memory. And yet, people out there have a very 3 limited -- people who are skilled in the art have a limited 4 selection of choices. 5 Isn't that kind of like the definition of how 6 this is supposed to work? 7 MR. MCANDREWS: Right. But there's going to be 8 substantial evidence of record that this is not compatible 9 with shared memory. And this is effectively letting her, 10 uncorroborated, to suggest that the invention was being 11 discussed. 12 I mean, you're familiar with the barbed wire 13 case. You need corroboration if you are going to say 14 there's prior art that exists. 15 THE COURT: Yeah. Yeah. But that's not what's 16 happening here, and I'm not going to let anyone argue that's 17 what's happening here. So -- 18 MR. SCHUMAN: That's not what's happening here. 19 I think Your Honor has it exactly correct. 20 And to Mr. McAndrews point, there's not going to 21 be some date attached to it. It's not about derivation. 22 It's the context of the person -- context in which a person 23 of ordinary skill in the art understood LB031, and that's 24 it. 25 MR. MCANDREWS: But she's saying that her
631 1 THE COURT: I'm not entirely sure what your 2 objection is. 3 MR. MCANDREWS: So she seems to be describing a 4 new category of prior art which is an oral disclosure that 5 she's just about to say the date of. There is no 6 corroboration for that. It was never put in in an opinion. 7 And she's also suggesting that there's 8 derivation by Mr. Tzannes who attended these meetings. 9 THE COURT: So the way I would interpret this is 10 because I don't think you were thinking of something like, 11 at least the first part of that is that this goes -- I mean, 12 this is what the people of ordinary skill in the art 13 understand at the time. It's like the scope of this, and I 14 don't think -- I'm positive the defendant's not going to 15 say, We now have a new theory. I mean, I think that's what 16 -- to the extent that this is what Mr. Schuman expected the 17 answer to be, I would think this is why the question has 18 been asked, and why the answer is relevant. 19 Because what people when they're skilled in the 20 art, that's the whole thing. She's saying she's trying to 21 take how people of ordinary skill in the art would have 22 thought about this. And that's -- you know, I've never 23 actually seen it happen before -- having a piece of prior 24 art, and you know, person of ordinary skill in the art in 25 the combination, well, this seemed like actually where it	633 1 knowledge is that people actually discussed shared memory in 2 the context of LB031, and that the standard is missing. 3 That's a different category of prior art. 4 THE COURT: I didn't interpret that to be -- 5 what she has said so far to be that specific. I thought she 6 said, and I may be making this up, but around about that 7 time or even at these meetings, we were discussing -- you 8 know, that's what people were discussing. I guess that's 9 kind of the way she said it. 10 MR. SCHUMAN: That's right. So -- 11 MR. MCANDREWS: There's no corroboration for 12 that. There's no evidence of that. That was never 13 disclosed to us, so we could go test if that's true or not. 14 We can put Mr. Tzannes back on the stand. He 15 can tell you that it's actually not true. 16 THE COURT: Well, he's a fact witness. He can 17 do that if he wants. 18 MR. SCHUMAN: Well, hold on. I don't think they 19 get a rebuttal case. I mean, this was her opinion disclosed 20 as what one of ordinary skill would understand. 21 THE COURT: So her saying people were discussing 22 it at the meetings, I understood her opinion was shared 23 memory was well known. You know, she perhaps has added a 24 wrinkle that was, you know, assuming this is elaboration on 25 what's well known, it's -- I take it she's never said this

634 1 before. 2 MR. SCHUMAN: Well, I don't know whether -- I 3 wasn't at the deposition in this case. I don't know whether 4 he chose to ask her that question, but her opinion disclosed 5 was one of ordinary skill in the art would understand as the 6 Court -- I don't want to recapitulate everything that the 7 Court has already said. This is the basis for her disclosed 8 opinion, why one of skill in the art would have understood 9 this reference to be compatible with either of these two 10 references. 11 THE COURT: Well, I'm going to allow you to 12 continue. Certainly, if I do think that because Mr. -- if 13 Mr. Tzannes wants to come back and say, no, nobody was 14 discussing that, you can do that. 15 MR. SCHUMAN: Okay. Thank you, Your Honor. 16 THE COURT: Okay. 17 (Conference held at side-bar was concluded.) 18 BY MR. SCHUMAN: 19 Q. So Dr. Jacobsen, I lost track. The objection came 20 while you were testifying. 21 Did you finish your answer to my last question, 22 if you can remember the last question? 23 A. I can't remember if I finished. 24 Q. So I don't want -- we don't have to restate all your 25 testimony, but the question was whether the subject of using	636 1 What is your opinion regarding whether LB031 2 discloses the message? 3 A. My opinion is that it discloses it. And in fact, 4 for -- again, just to distinguish between the three claims, 5 I'm not going to belabor each claim independently, but claim 6 1 requires an interleaver. And then the other two claims 7 require the deinterleaver. 8 But LB031 discloses that the CO side, the 9 central office side unit and the customer side unit exchange 10 memory -- sorry, not memory, but the interleaver delay in 11 terms of octets. And so they exchange their delays in terms 12 of octets just like in the standard, and this is so that 13 they can actually interoperate the second -- is my pointer 14 working -- for interoperability reasons, they have to 15 exchange the interleaver delay in terms of octets. It 16 specifies that the actual amount of memory used to meet that 17 delay is implementation specific. 18 And also discloses that the smallest amount of 19 memory required to build the interleaver deinterleaver pair 20 is equal to the total delay, and that half of that delay 21 gets allocated to the transmitter and receiver. And so the 22 possible -- smallest possible amount of memory for either of 23 them is I minus one times D minus one over two. So LB031 24 discloses the message as recited in TQ Delta's patents. 25 Q. Go to the next slide for me, Dr. Jacobsen.
635 1 shared memory and VDSL was being discussed at the standards 2 body meetings around the time of LB031? 3 A. And my recollection is that, yes, it was. 4 Q. Dr. Jacobsen, we'll move on to the next element of 5 these claims. So just before we do, what is your opinion 6 for the members of the jury regarding the relationship of 7 LB031 and the preamble of each of these claims? 8 A. Well, can I quickly just go through the -- I don't 9 think I talked about the transceiver and the information. 10 Q. Certainly. Certainly. 11 A. Yeah, I don't think I finished this slide. So claim 12 1 and claim 13 require a transceiver. The LB031 13 contribution discloses a VDSL2 transceiver. And as far as 14 the claim 5 of the '381 requiring as I believe Dr. Cooklev 15 said basically a storage medium somewhere that the code is 16 stored, the code to be executed. Every VDSL or DSL 17 transceiver that I've ever encountered has a processor and 18 some code that runs on the processor. 19 So that limitation, in my opinion, would have 20 been disclosed to a person who was reading the LB031 21 contribution at the time. Okay. Now, I'm done. 22 Q. All right. So let's move on to the yellow shaded 23 element, transmitting or receiving a message. It's a 24 mouthful, so I won't restate it. I think we all know by now 25 what this limitation is, what this element is.	637 1 A. Yes. 2 Q. Do you see the highlighted phrase, the actual amount 3 of memory used is implementation specific? 4 A. Right. 5 Q. Is that the same phrase that's used in LB031? 6 A. Almost to the word, yes. 7 Q. Why is that? 8 A. Well, I mean, LB031 was submitted to the VDSL2 group 9 that was drafting the VDSL2 standard and would have been 10 considered and potentially adopted. And the fact that the 11 language in the standard is basically almost verbatim what 12 was in LB031 suggests to me that the contents were, in fact, 13 adopted into the VDSL2 standard. 14 So, and again, what LB031 is proposing, which is 15 that interleaver delay in terms of octets should be 16 exchanged, and that the amount of memory is implementation 17 specific. Similarly, each path requires delay octets which, 18 again, is I minus one times D minus one over two. That's 19 how much minimum memory is needed to meet the delay. And 20 then the actual amount used is minimum implementation 21 specific. So the standard is consistent with the 22 disclosures of LB031. 23 Q. So just to wrap up your opinion, does LB031 disclose 24 this first element of the claims? 25 A. It does. It discloses the message.

638 1 Q. Let's move on to the next element. This is what some 2 have referred to as the determining -- determining the 3 amount of memory. What's your opinion whether LB031 4 discloses this step? 5 A. My opinion is that it does, and I'll show you the 6 excerpts here. The LB031 contribution discloses that the 7 smallest possible memory for either the interleaver or 8 deinterleaver. So covering all three claims is I minus one 9 times D minus one over two. So that's determining the 10 minimum amount of memory required. 11 It also discloses unsurprisingly the use of 12 Reed-Solomon coding. This was in the context of VDSL2. It 13 was already decided that it would have Reed-Solomon coding. 14 And so LB031 is in that context, so my opinion is that it 15 does disclose the determining limitations. 16 Q. If you go back one slide, Dr. Jacobsen, I minus one 17 times D minus one over two? 18 A. Yes. 19 Q. Is that the same equation used in Dr. Cooklev's 20 infringement slide from yesterday? 21 A. Yes, it is. 22 Q. Why is that? 23 A. Well, as I understand it, he has concluded that I 24 minus one times D minus 1 over two is exactly the amount of 25 memory being used. And that's the amount of interleaver	640 1 the line; and therefore, messages are exchanged in order for 2 the two transceivers to be able to coordinate what their 3 interleaving parameters are going to be so that they don't 4 exceed the others capabilities. 5 So LB031 describes that in the same example that 6 we were just referring to that during initialization, a 7 VDSL2 transceiver would indicate that can support up to 44.5 8 megabits per second and 29,092 or more octets of interleaver 9 delay. So it's telling the other side, the minimum delay 10 that it can support at that bit rate. And then that would 11 mean that it would say the maximum delay it supports is at 12 least 29,092 octets. The minimum amount of memory required 13 for either the interleaver or the deinterleaver is then half 14 of that amount which is 14,546. 15 So in my opinion, it meets the wherein clause. 16 Q. Let's move on to the next clause or the next element, 17 what some have referred to as the second allocating step. 18 Is it your opinion that LB031 discloses the second 19 allocating step in these claims? 20 A. It is. And the reason is for the same reason that it 21 discloses the first allocating step because it just flips 22 interleaver and deinterleaver in the different claims. And, 23 again, LB031 specifies that the smallest amount of memory 24 needed is (I minus one) times D minus one) over two. And 25 that holds for the interleaver and the deinterleaver.
639 1 memory that LB031 explains is the smallest amount that you 2 could use. 3 Q. Okay. Let's move on to the next element. This is 4 the allocating step. 5 Again, I won't read all the words. What is your 6 opinion regarding whether LB031 discloses the allocating 7 step? 8 A. My opinion is that it does. The LB031 contribution 9 provides an example, for example, that says that if a 10 transceiver supports a particular bit rate, in this case 11 44.5 megabits, it then calculates based on the minimum 12 interval delay in time, what the transceiver delay in octets 13 must be. And it concludes that the delay in octets must be, 14 sorry, 29,092 octets which corresponds to having an 15 interleaver memory of at least 14,546 octets. 16 So this would disclose that the amount of memory 17 that needs to be allocated is this 14,546 octets. 18 Q. Based on this excerpt of LB031, is it your opinion 19 that LB031 discloses the allocating step? 20 A. Yes, it is. 21 Q. Let's move on to the wherein clause. Is it your 22 opinion that LB031 discloses the wherein clause? 23 A. It is. And again, LB031 is concerned with a 24 transceiver on one end of the line having a different amount 25 of delay capability than the transceiver on the other end of	641 1 And again, Reed-Solomon coding is also 2 disclosed. So I concluded that the second allocating 3 limitation is also met. 4 Q. Let's move on to the next element, Dr. Jacobsen. It 5 is long. I won't read it, but this is the deinterleaving of 6 the second amount of bytes. 7 Can you tell the members of the jury your 8 opinion about whether LB031 discloses that element? 9 A. Yes, and my opinion is that it does. This is just 10 straight interleaving and deinterleaving once the memory has 11 been allocated. So unsurprisingly, the LB031 contribution 12 describes the use of convolutional interleaving and the use 13 of a deinterleaver to undo what the interleaver did, and 14 says that this applies to all the interleavers being 15 considered for VDSL. 16 So basically this claim limitation just requires 17 actually interleaving and deinterleaving which is what LB031 18 is all about. 19 Q. Thank you. Let's move on to the last element of each 20 of these claims, the wherein the shared memory allocated to 21 the deinterleaver is used at the same time as the shared 22 memory allocated to the deinterleaver, or in the case of 23 claim 1, the interleaver deinterleaver words are inverted. 24 What is your opinion regarding whether LB031 25 discloses this element of each of these claims?

1 **A.** My opinion is that it does. And the Court has
 2 actually construed this phrase to mean that the
 3 deinterleaver reads from, writes to or holds information for
 4 deinterleaving in its respective allocation of the shared
 5 memory at the same time as the interleaver reads to, writes
 6 to or holds information for interleaving in its respective
 7 allocation of the shared memory.

8 And again, LB031 does not actually use the words
 9 shared memory, but there are only two ways of doing this,
 10 either with dedicated memory or with shared memory. And so
 11 for the shared memory part, a person having ordinary skill
 12 would read it as including shared memory.

13 And then at the same time, VDSL2 already by this
 14 point was known that it would be what Dr. Cooklev correctly
 15 referred to as a full duplex system where it transmits and
 16 receives at the same time. So under the Court's definition
 17 of this limitation, the VTU-O and VTU-R are both
 18 transmitting and receiving. They would be doing so at the
 19 same time; and therefore, they would be using the shared
 20 memory allocated to the interleaver at the same time as
 21 using the shared memory allocated to the deinterleaver.

22 **Q.** Thank you, Dr. Jacobsen. I want to ask you one more
 23 question about LB031 before we move on to Mazzoni.

24 Is it your opinion that a person of ordinary
 25 skill in the art would have understood that TQ Delta claims

1 as obvious in the light of LB031?

2 **A.** Yes. It is my opinion that it would have been
 3 obvious.

4 **Q.** All right. Let's move on to Mazzoni.

5 Can you describe briefly for the members of the
 6 jury, please, the Mazzoni prior art patent?

7 **A.** Sure. So the Mazzoni patent was filed in July of
 8 2001 by Simone Mazzoni and Helene Came.

9 **Q.** I take it from that, you don't know Mazzoni or the
 10 other inventor?

11 **A.** I do not. I have not met either of them. They
 12 actually patented a device that not only uses shared memory,
 13 but actually uses it in a VDSL environment for interleaving
 14 and deinterleaving. And specifically what the -- I can't
 15 remember if I have another -- yes, so the -- I showed you
 16 Figure 6 before and I've reproduced it here again annotated.

17 You have the interleaver in the blue and the
 18 deinterleaver in pink. And we have a shared memory MM
 19 which gets split between the interleaver and deinterleaver.
 20 Mazzoni actually even refers to that memory MM as shared
 21 memory. You can see it in Claim 13 of the Mazzoni.

22 It also describes assigning a first memory space
 23 of it for interleaving and the second memory space for
 24 deinterleaving, and it talks about how the sizes of those
 25 two spaces are going to depend on what the bit rates are for

1 transmitting and receiving.

2 **MR. SCHUMAN:** Your Honor, I offer Mazzoni into
 3 evidence. It's JTX 356.

4 THE COURT: All right. Admitted without
 5 objection.

6 BY MR. SCHUMAN:

7 **Q.** Dr. Jacobsen, is it your opinion that Mazzoni has the
 8 shared memory as it's been construed by the Court in the
 9 this case?

10 **A.** Yes, absolutely.

11 **Q.** Can you explain for the members of the jury the basis
 12 for your opinion in that regard?

13 **A.** Well, the Court has construed shared memory as the
 14 memory is used to hold, or be read from, or written to
 15 information for the interleaver at the same time as the
 16 deinterleaver, and that's exactly what's shown in Figure 6.
 17 It's exactly what's claimed in Claim 13 of Mazzoni and other
 18 disclosures in the patent.

19 But the key that makes it shared memory versus
 20 not shared memory is the fact that that boundary between the
 21 part allocated for the interleaver versus the deinterleaver
 22 can move from time to time. And Mazzoni discloses that.

23 **Q.** Now, you were in the courtroom for opening statements
 24 in this case; right?

25 **A.** I was.

1 **Q.** You heard Mr. McAndrews say that LB031 would "break"
 2 Mazzoni?

3 **A.** I did hear that.

4 **Q.** And is it your opinion that LB031 would break
 5 Mazzoni?

6 **A.** It is not. I don't think that it would break it.
 7 What Mr. McAndrews was referring to is that in Mazzoni,
 8 instead of having a wide variety of bit rates available,
 9 Mazzoni defines exactly 12 combinations of downstream and
 10 upstream bit rates. And for each of those combinations, it
 11 picks exactly one set of interleaving and deinterleaving
 12 parameters. And then depending on which service is actually
 13 in use, it pulls from a table that it keeps the correct
 14 interleaving and deinterleaving parameters.

15 So Mazzoni basically insulates and is very
 16 inflexible because it requires only -- it allows only 12
 17 services with only the interleaving and deinterleaving
 18 parameters that were pre-configured, and they're stored in
 19 the table in Mazzoni. And I think Mr. McAndrews' suggestion
 20 is that there is no reason to have any kind of messaging
 21 because those -- the messages are stored in the transceiver.
 22 And my opinion is that a person having ordinary skill in the
 23 art would recognize that that table in Mazzoni is very
 24 limiting, and that it would be much more flexible if instead
 25 of preconfiguring it, prestoring everything that the

646 1 transceiver is capable of doing, instead if you negotiated 2 which was common practice in DSL transceivers at the time, 3 that that would result in a much more flexible system. 4 So it wouldn't work if you just bolted the 5 messaging on to Mazzoni, it would be redundant, but if you 6 were -- if you recognized that that table and that 7 preconfigured nature of Mazzoni as a weakness, I think 8 people having ordinary skill would have recognized it as a 9 weakness, it wouldn't have been the kind of transceiver that 10 a service provider would have wanted to buy, then putting 11 the Mazzoni messaging in place would have been a clear 12 benefit. 13 Q. Is it your opinion that a person of ordinary skill in 14 the art at the time would have been motivated to combine 15 LB-031 with Mazzoni? 16 A. Yes, definitely. 17 Q. Can you explain the basis for that opinion? 18 A. I would love to. 19 Both of these contributions actually refer to 20 trying to manage complexity of an interleaver. And LB-031 21 says the size of the interleaver memory will be a major 22 source of complexity in VDSL2. And, again, complexity is 23 our little code word for cost. 24 And the Mazzoni patent says that one of the 25 objects of the invention is to provide a transceiver, a	648 1 clerical error or an error of minor character, that a 2 patentholder can request that it be corrected. And the 3 certificate of correction is as I understand it the tool 4 that is used to do that. 5 Q. So let's move on now to the substance of your 6 opinion. 7 Is it your opinion that the certificate of 8 correction for claim 5 of the '381 patent merely corrected 9 an obvious typographical or clerical error? 10 A. It is my opinion that it corrected one clear 11 typographical error, but it corrected -- changed two things 12 that I don't think a person having ordinary skill would have 13 recognized as an obvious typographical or clerical error. 14 Q. What's the obvious clerical error? 15 A. The obvious one is the shred memory, which I can't 16 remember which limitation. It's down here in the last, see 17 shred memory. That would have been an obvious typographical 18 error. Clearly there is no shred memory anywhere else and 19 it was all about shared memory, so a person having ordinary 20 skill would have recognized shred memory as a typo. 21 Q. How about the other changes that were made by the 22 certificate of correction to claim 5 of the '381 patent? 23 A. Well, those changes are more substantive. The claim 24 as issued recited in the first allocated step, allocating 25 bytes to a deinterleaver to deinterleaver first plurality of
647 1 modem architecture that requires a reduced quantity of 2 memory. And specifically aims to significantly reduce the 3 size of the memory means that are used for interleaving and 4 de-interleaving. So the two are aimed at solving the exact 5 same problem in the exact same type of environment, VDSL. 6 Q. Thank you, Dr. Jacobsen. 7 MR. SCHUMAN: Your Honor, I'm going to move on 8 to the last topic. 9 THE COURT: Yes. 10 MR. SCHUMAN: Thank you. 11 BY MR. SCHUMAN: 12 Q. So Dr. Jacobsen, we'll finish by talking about your 13 opinions regarding the two certificates of correction. 14 A. Okay. 15 Q. Dr. Jacobsen, have you formed opinions regarding the 16 two certificates of correction regarding the '882 and the 17 '381 patent? 18 A. I have, yes. 19 Q. What is your opinion? 20 A. Well, my opinion is -- 21 Q. Can I interrupt you? I'm sorry. 22 Before we do that, explain to the members of the 23 jury what a certificate of correction is? 24 A. As I understand it, a certificate of correction is 25 something that if a patent has a clear typographical or	649 1 Reed Solomon coded data bytes for transmission at a first 2 data rate, and then the second allocating limitation is for 3 the interleaver and it says that the interleaver, 4 interleaves a second plurality of coded data bytes received 5 at a second data rate. And my opinion is a person of 6 ordinary skill would not have considered that in light of 7 the disclosures of the patent to be an obvious typographical 8 or clerical error. 9 Q. As written here, did the claim make sense to you, 10 that is prior to the certificate of corrections for this 11 patent? 12 A. Yes. And let me explain how I assess this. I read 13 the patent from start to finish, and then read the claims, 14 and on that basis, I concluded that these claims make sense 15 given what's in the rest of the patent. I'll show claim 13 16 if that's okay. 17 Q. Let's move on to claim 13 of the '882 patent. This 18 was also subject to a certificate of correction. What is 19 your opinion regarding whether the certificate of correction 20 for this patent merely corrected an obvious typographical 21 error or clerical error? 22 A. It's the same for claim 5 of the '381, because it's 23 the same changes that were made. Again, it says shred 24 memory down here. Shred memory down here. And then in the 25 first allocating step there is the word transmission and in

650 1 the second allocating step there is the word received. And 2 again, for the same reasons that claim 5 would have made 3 sense, this claim would have also made sense. 4 And I have an excerpt actually on the next slide 5 to explain why I think a person having ordinary skill would 6 not have considered these to be errors, actually. 7 So this excerpt from the patent is actually from 8 I believe it's the beginning of the detailed description, 9 the patent starts out talking about how the specific, they 10 call them embodiments of the invention are not limiting and 11 that they -- that it can be -- the invention can be applied 12 to much broader types of devices and setups. 13 And in this paragraph in particular, it talks 14 about how the exemplary embodiments shown in the patent show 15 all of the components colocated, meaning in one physical 16 location. But then it says it's to be appreciated that the 17 various components of the system can be located at distant 18 portions of distributed network. So in other words, they 19 don't have to be colocated, they can be elsewhere. 20 It also says at the end that one or more 21 functional portions of the system could be distributed 22 between a modem and an associated computing device, so in 23 other words, part of it might be in the transceiver and part 24 of it might be in say the computer receiving the information 25 from the transceiver.	652 1 And one of the examiners actually did notice shred and 2 pointed it out to the applicant and the applicant fixed 3 shred, but didn't change the words that were then changed 4 here. 5 And just the fact that so many people missed 6 what was I guess supposed to be an obvious typographical 7 error, to me given the disclosures of the patent and the 8 fact that so many people did not see what I guess is 9 supposed to now be an error, I considered that and it 10 convinced me that it's not an obvious typographical error. 11 MR. SCHUMAN: Thank you, Dr. Jacobsen. I pass 12 the witness, Your Honor. 13 THE COURT: All right. So I think probably 14 we'll break for lunch here. What you all told me at the 15 last break, you both still want to do that? 16 MR. MCANDREWS: Yes, Your Honor. 17 MR. SCHUMAN: Yes, Your Honor. 18 THE COURT: Okay. So we're going to have 19 forty-five minutes for lunch. So we'll start again at about 20 25 after 1:00. Okay. So can we take the jury out for 21 lunch. 22 (Jury leaving the courtroom at 12:36 p.m.) 23 THE COURT: All right. Dr. Jacobsen, you can 24 stand down. Everyone, be seated. 25 So once Dr. Jacobsen is finished, what do you
651 1 And so when I looked back at the claims, it's 2 entirely possible given that these components can be 3 distributed that a deinterleaver would de-interleave a first 4 plurality of Reed Solomon coded data bytes for transmission 5 at a first data rate. If the components are distributed and 6 not colocated, that would make sense. 7 So I concluded that a person having ordinary 8 skill would not have considered these to be obvious 9 typographical errors. 10 Q. Other than the portion of the specification that you 11 highlighted on this slide, did you consider any other 12 evidence in forming your opinion regarding the certificates 13 of correction? 14 A. Yes, I did. I looked at what is called the file 15 history of the patents, which is a written record of what 16 happened with the Patent Office. And I noted that these 17 were not the only two patents where this -- these words were 18 used. They were actually used in the -- Mr. Tzannes 19 referred to the parent application when he testified. They 20 appeared there. They also appeared in a claim of the '048 21 patent that's at issue, but that was not asserted in this 22 case. 23 I also noted that the -- first of all the 24 applicant didn't notice the supposed error. Two patent 25 examiners did not notice or think that there was an error.	653 1 have left, Mr. Schuman? 2 MR. SCHUMAN: Dr. Yu. 3 THE COURT: All right. So Ms. Haynes, are you 4 still out there? 5 MS. HAYNES: Yes, Your Honor. 6 THE COURT: Come on forward. 7 MS. HAYNES: I also have my co-counsel with me 8 as well, Ms. Banzhoff. 9 THE COURT: Okay. I read the declaration of 10 Dr. Yu and I read your latest letter, and I'm not going to 11 close the courtroom for Dr. Yu's testimony. I'm certainly 12 less than convinced that the first amendment right to open 13 trial is outweighed by essentially very general statements 14 that has a potential harm to Broadcom. So I'm not going to 15 do that. Did you have a back up plan, I can't remember now, 16 I read the letter a few hours ago, so there may be some 17 things that I have forgotten about it. 18 MS. HAYNES: I think just the same structure 19 that we have been following. Obviously we don't want source 20 code on the big screen. 21 THE COURT: Right. I think we're all agreed on 22 that. In terms of you mentioned two exhibits which I 23 believe in the letter you called data -- just reading the 24 letter, I couldn't recall what it was you were referring to, 25 these are the 2Wire documents that supposedly were the same

654 1 as the Broadcom documents I already said were sealed. 2 MS. HAYNES: Correct. There were two slides in 3 Dr. Cooklev's slide that were actually zoomed in on and they 4 said Broadcom and they had the chip name and they had data 5 sheet and they zoomed in on the particular paragraph. 6 THE COURT: That was in the demonstratives? 7 MS. HAYNES: Correct. 8 THE COURT: But they -- 9 MS. HAYNES: So our request was that TQ Delta be 10 reminded that to the extent those exhibits be under seal as 11 well they shouldn't be shown on the big screen. 12 THE COURT: Mr. McAndrews, I know you have a lot 13 of things to be concerned about. Do you or someone on your 14 team know about the two exhibits that Broadcom brought up 15 and have any comments. 16 MR. MCANDREWS: Mr. Prange just walked back in. 17 THE COURT: Mr. Prange, welcome back. You're on 18 the spot. 19 MR. PRANGE: Thank you, Your Honor. 20 THE COURT: So the letters from Broadcom 21 referred to two exhibits that apparently Dr. Cooklev used in 22 his slides. I don't know if they're admitted into evidence 23 or not. I think they were, Exhibit 42 and I don't remember 24 the other number, but the gist of it was these are things 25 that I sealed when they were coming directly from Broadcom,	656 1 call for privileged information. 2 THE COURT: I kind of find it hard to believe 3 that anybody is going to be asking about that. If for some 4 reason someone says what did your attorney tell you or what 5 did you tell your attorney, when I say Ms. Banzhoff, you can 6 sit in the first row in the first bench somewhere, if you 7 stand up there and say anything, I will take between the 8 signaling of the question and you standing up, we'll have a 9 side-bar, but I can't believe that's actually going to 10 happen. 11 MS. HAYNES: It may not be that direct, Your 12 Honor, but there may be some questions that would 13 potentially elicit privileged information. 14 THE COURT: Does anybody from either side know 15 what Broadcom is talking about? 16 MR. PRANGE: No, Your Honor. 17 MR. SCHUMAN: No. 18 THE COURT: Okay. We'll keep up on it. We'll 19 be in recess until 25 after 1:00. 20 (A luncheon recess was taken.) 21 DEPUTY CLERK: All rise. 22 THE COURT: So my law clerk is handing out a set 23 of jury instructions for each of you, which again we won't 24 be getting them until we're finished for the day, but I 25 figured you could have somebody start looking at them.
655 1 and now the versions from 2Wire have been the same thing, 2 they have been published or something. Do you know what I'm 3 talking about? 4 MR. PRANGE: Vaguely, I do, I think I was in the 5 back of the courtroom for part of his testimony, and I think 6 -- 7 THE COURT: So what I would like you to do is, 8 you know, I'm sure the representations of Broadcom is 9 correct, and I would like not to have information that I 10 protected in Broadcom's displays on the big screen just 11 because it came from 2Wire. So I'm just wondering if you 12 can work with -- check with Broadcom to make sure that 13 they're talking about same thing that based on the 14 representations and the letter, even though I don't know 15 exactly which two exhibit numbers they are now, I will seal 16 the two exhibits. And if we have more like that, let's use 17 the source code screen for that. Okay? 18 MR. PRANGE: Certainly, Your Honor, we have no 19 objection to the sealing or using the screen and we'll 20 confer. 21 THE COURT: Okay. Are we good? 22 MS. HAYNES: I think we have one more issue. 23 Just a logistical issue. Ms. Banzhoff is here. Dr. Yu is 24 represented by counsel. We're just not intending to object 25 except to the extent that there is a question that would	657 1 All right. Are we ready to begin? 2 Dr. Jacobsen, come on forward. And let's get 3 the jury. 4 Are there binders to be handed out? 5 MR. SCHUMAN: Yes, Your Honor. 6 THE COURT: Why don't we start doing that, too. 7 (Jury entering the courtroom at 1:24 p.m.) 8 THE COURT: All right. Members of the jury, 9 welcome back. Everyone, you may be seated. 10 Mr. McAndrews, you may proceed when you're 11 ready. 12 MR. MCANDREWS: Thank you, Your Honor. 13 CROSS-EXAMINATION 14 BY MR. MCANDREWS: 15 Q. Good afternoon, Dr. Jacobsen. How are you? 16 A. I'm well. Thank you, Mr. McAndrews. 17 Q. Nice to see you again. 18 A. Good to see you, too. 19 Q. So I've got a couple of questions for you about your 20 background. Since 2006, you haven't worked for any 21 companies in the DSL business, have you? 22 A. Other than in the context of this case? 23 Q. Correct. 24 A. Correct. 25 Q. So you haven't worked since 2006 as a DSL engineer;

658 1 is that right? 2 A. That's correct. 3 Q. Okay. And before 2006, at that time, you worked for 4 several companies in the DSL business? 5 A. Do you have a particular time frame in mind or -- 6 Q. Just prior to -- any time prior to 2006, you had 7 worked for approximately three separate DSL companies? 8 A. I worked for Amati, as I mentioned, and then I worked 9 for TI which acquired -- sorry, Texas Instruments, which 10 acquired Amati. And then I consulted for 2Wire and did some 11 work for PMC-Sierra also in the DSL space. 12 Q. Okay. So how many years did you work in the DSL 13 business? 14 A. As an engineer? 15 Q. As an engineer. 16 A. I would estimate continuously probably about 17 12 years. 18 Q. Okay. So -- 19 A. Twelve years. 20 Q. And during that entire 12-year period, you never 21 designed any hardware for interleaving or deinterleaving; 22 correct? 23 A. That's correct. 24 Q. And you never designed any logic of any kind for 25 interleaving and deinterleaving; right?	660 1 Q. Okay. And during that time, you formed friendships 2 with people at 2Wire? 3 A. I would not say I formed those friendships at 2Wire. 4 I knew folks from 2Wire before I started working there as a 5 consultant. I had friends who worked at 2Wire. 6 Q. And you remain in touch with people you had worked 7 with at 2Wire; is that correct? 8 A. I do. Correct. 9 Q. And you knew Mr. Ben Miller, 2Wire's witness who 10 testified earlier when you worked there? 11 A. I met Ben at 2Wire, yes. 12 Q. Now, you were hired by 2Wire to provide expert 13 testimony in this case; right? 14 A. I was hired by -- I believe it was Morgan Lewis. 15 Q. Okay. Morgan Lewis is the attorneys that represent 16 2Wire in the case? 17 A. At the time, yes. That was who contacted me. 18 Q. And you understand that your testimony in this case 19 is as an expert witness; correct? 20 A. That's correct. 21 Q. And your testimony is supposed to look at facts and 22 supposed to be unbiased; correct? 23 A. Correct. 24 Q. But you feel indebted a bit to 2Wire; right? 25 A. I don't today feel indebted to 2Wire.
659 1 A. That's correct. 2 Q. And you never designed any interleaver or 3 deinterleaver memories; correct? 4 A. That's correct. I was a system engineer, so... 5 Q. Okay. So you worked for PMC-Sierra as a consultant 6 for a period of time? 7 A. I did, yes. 8 Q. And during that time, again, no interleaver or 9 deinterleaver design logic memories of any kind; correct? 10 A. That's right. 11 Q. Okay. Same answer for Amati and TI? 12 A. That's correct. I was on the -- the system -- system 13 engineering side of DSL. 14 Q. Okay. And you consulted for 2Wire for a period of 15 time; right? 16 A. That's correct. 17 Q. And again, no design of any interleaver or 18 deinterleaver logic memory hardware of any kind? 19 A. That's correct. 20 Q. Now, so talking about your work for 2Wire, you worked 21 as a consultant for 2Wire? 22 A. That's correct. 23 Q. And you did that for a period of two years from 2004 24 to 2006 approximately? 25 A. That's right.	661 1 Q. You have in the past felt indebted to 2Wire; correct? 2 A. 2Wire was a great client, and I enjoyed working for 3 2Wire in the 2004 to 2006 time period. 4 Q. Okay. Well, in fact, you went out of your way -- you 5 mentioned earlier that you had -- you had given a special 6 dedication to Dr. Cioffi on one of your books? 7 A. That's right. 8 Q. You considered him to be an important person in your 9 life? 10 A. Yes. 11 Q. And so dedications in books are usually dedicated to 12 people who really have special meaning to you? 13 A. Usually, yes. 14 Q. Okay. And you did that for 2Wire; right? 15 A. I believe I thanked 2Wire for the consulting 16 opportunity. 17 Q. Can we take a look at that? And this is -- I believe 18 it's JTX 109. It's in your binder there. 19 A. Okay. 20 Q. So I'm reading from the acknowledgements page here, 21 and this is Page 11, small Roman ii in the book. And down 22 there at the bottom, it says, Krista thanks the good people 23 of 2Wire for the consulting gig that allowed her to eat and 24 pay the mortgage while she was leaving ample time to figure 25 out her next career move.

662 1 Is that right? 2 A. Yes. 3 Q. Okay. So 2Wire's a pretty special company to you; 4 right? 5 A. At the time I wrote this acknowledgement, they were, 6 yes. 7 Q. Okay. And you continue to make significant money off 8 them right now, don't you? 9 A. I do the work that needs to be done for this case. 10 Q. Mm-hmm. And you're being paid well for that; right? 11 A. I am being paid well. Yes. 12 Q. So one of the reasons that 2Wire hired you was to 13 give 2Wire a presence at the ITU; right? 14 A. That's correct. 15 Q. And isn't it true that before you arrived, they had 16 no presence at the ITU? 17 A. I don't know that they had no presence, but they 18 didn't have regular presence. 19 Q. Do you recall giving a deposition on this topic? 20 A. I probably do. 21 Q. Okay. Do you recall that you said that before your 22 involvement, they had no participation at all in the ITU? 23 A. That may be true. That may have been my 24 recollection. 25 As I said, I don't remember specifically that no	664 1 A. You mean a physical substantiation? 2 Q. Yes, something that someone actually built. 3 A. I haven't identified any specific ones, that's 4 correct. 5 Q. Now, you relied on -- to prove invalidity, you relied 6 on two hypothetical combinations for your opinions that 7 Mr. Tzannes' patents are invalid; right? 8 A. At least two, yes. 9 Q. Well, it's exactly two; right? 10 A. That I presented today? 11 Q. Correct. 12 A. Yes. 13 Q. Okay. And LB031 and the so-called knowledge of one 14 of ordinary skill in the art, that's one combination; right? 15 A. That's correct. 16 Q. And LB031 and Mazzoni, that's another combination; is 17 that right? 18 A. That's right. Yes. 19 Q. Okay. But you never identified any evidence that 20 anybody had actually combined Mazzoni with LB031; right? 21 A. That's correct. 22 Q. Now, your opinion is that Mazzoni disclosed shared 23 memory; is that right? 24 A. That's right. 25 Q. And Mazzoni was published, I think you pointed out
663 1 one from 2Wire was ever there. Sometimes people attended 2 and didn't announce themselves, but nobody I knew from 2Wire 3 had been attending regularly before they hired me. 4 Q. And if you don't remember, then they certainly didn't 5 contribute anything of note to the DSL standards creation; 6 right? 7 A. To my knowledge, not in the ITU. 8 Q. Now, let's talk about invalidity just for a minute 9 here. I just want to get some things straight. 10 So you have not identified any single reference 11 that teaches all of the elements of the asserted claims; 12 correct? 13 A. That's correct. 14 Q. And you haven't identified any single device that has 15 all elements of the asserted claims; right? 16 A. Can you repeat your question? I'm not sure I 17 understood the context. 18 Q. You haven't identified any single device that existed 19 before patents were filed? Before the invention of 20 Mr. Tzannes, you haven't identified any single device that 21 had all of the elements of the claims in the case; correct? 22 A. That is correct. 23 Q. Okay. And you did not identify any single device, 24 any device at all that includes shared memory before the 25 inventions in the case; correct?	665 1 that the filing date was maybe in 2001, but the publication 2 date is in 2002. Does that sound right? 3 A. I would have to look at it. I don't recall off the 4 top of my head. 5 Q. And then later in 2004, LB031 came along; is that 6 right? 7 A. June of 2004, I believe. 8 Q. Okay. And LB031 did not include any explicit 9 disclosure of shared memory; right? 10 A. LB31. 11 Q. LB, yeah, 031. 12 A. That's correct. It did not have an explicit 13 disclosure of any memory configuration. 14 Q. You would admit maybe it discloses it, maybe it 15 doesn't, but it doesn't say one way or the other; right? 16 A. As I said, it doesn't disclose any particular memory 17 configuration. 18 Q. So somebody reading it isn't going to say, oh, 19 there's shared memory; right? 20 A. Well, if -- someone reading it is going to understand 21 that there are only two ways to do memory, and one is shared 22 and the other is dedicated. So -- 23 Q. Right. But you would agree with me there's some 24 significant differences between shared memory and dedicated 25 memory as we've heard throughout the trial; correct?

666 1 A. There are differences between shared memory and 2 dedicated memory. 3 Q. Okay. And so if someone was going to disclose shared 4 memory that hadn't been in any device prior, as you admit, 5 don't you think they'd want to mention it if that's what 6 they meant? 7 A. Well, I did not admit that there was not shared 8 memory on any device. You asked me if I had identified a 9 device that had shared memory. 10 Q. Wasn't that kind of the same thing? Your role in the 11 trial was to come forward with evidence, prior art, and you 12 don't have any evidence that there was a prior device that 13 had shared memory; correct? 14 A. I don't have any evidence, but I also would not be 15 comfortable at all saying that there was never a device that 16 used shared memory. I don't know. I haven't investigated 17 all the devices. 18 Q. Okay. But you're the expert here that's supposed to 19 say whether something like that was done, and you haven't 20 identified any; right? 21 A. I did not identify any. 22 Q. Okay. And on that topic, I think during the direct 23 exam, you said that -- and I don't want to misquote you 24 here, but said something along the lines of shared memory 25 was being discussed at the ITU meeting.	668 1 Q. Okay. So you're suggesting that people were 2 discussing shared memory prior to 2004 at the ITU? 3 A. That's correct. 4 Q. But you have no record of that of any kind that's 5 been presented in this case? 6 A. I don't have any record. I would have captured that 7 in my meeting notes that I would have taken at the ITU 8 meeting. 9 Q. Okay. Can you name a single individual you heard a 10 discussion like that with? 11 A. Sure. Lots of people. Andy Deczky was one person 12 who was very interested in shared memory. There was an 13 engineer from Infineon. I don't recall his name off the top 14 of my head. 15 Q. Are you saying these were private discussions, or 16 they were discussed in open meetings? 17 A. Both. People were would talk at coffee breaks. 18 People would talk during the meeting. 19 Q. So people would just stand around and talk about 20 shared memory? That sounds a little silly, doesn't it? 21 A. People would talk about all kind of things in the 22 context of the contributions that were being presented, 23 about the solutions that were being offered, and about the 24 problems that needed to be solved. 25 Q. Right. And nobody put shared memory into any device
667 1 Did you intend to say that? 2 A. Yes, I did. 3 Q. And what time frame was that? 4 A. It was while I was still at TI. 5 Q. Oh, so you're claiming that people were discussing 6 shared memory at the ITU meetings? 7 A. Yes. 8 Q. Okay. But you don't have any record of that of any 9 kind, do you? 10 A. Well, I left all of my notes with Texas Instruments 11 when I left. 12 Q. Well, I mean, if there was a -- well, so set aside 13 your personal notes just for a moment. But 2Wire paid you a 14 significant amount of money to try to help them dig up prior 15 art; right? 16 And if shared memory had been discussed 17 somewhere, anywhere on the planet, you guys would have 18 scoured the earth for it; right? 19 A. I only looked at a limited number of materials. I 20 don't know what the attorneys looked for, but I was focused 21 on things like I was aware of. So -- 22 Q. Okay. So when you say you were at TI, what time 23 frame is that? 24 A. I was there from when they acquired us in early 1998 25 through early May of 2004.	669 1 until approximately 2006 are later; right? 2 A. I don't agree with you. I don't know what people 3 were doing. It's an implementation detail. So people could 4 have been putting shared memory into products since the mid 5 '90s. I just don't know. I didn't investigate -- I don't 6 have any way to know how we did it in our VDSL product. I 7 would be guessing if I told you that it was dedicated or 8 shared. Likewise, I don't know how Alcatel did it, I don't 9 know how Rosenbaum did it, I have no idea how people did it. 10 It's an implementation detail. It's the kind of thing 11 people would discuss at a coffee break because they're 12 talking about I have to implement this thing, how am I going 13 to do it. I want to do it this way, somebody else maybe 14 wants to do it a different way and somehow we have got to 15 come to an agreement of what we're going to put in the 16 standard. 17 Q. The ITU -- and we agree that shared memory is kind of 18 a big deal; right? You can put in half the amount of memory 19 you need; right? 20 A. You can reduce the amount of memory that you need, 21 yes. 22 Q. And that's significant, you want to reduce the amount 23 of memory. In fact, I think you had a chapter in one of 24 these books that talks about how important it is to reduce 25 memory; right?

670 1 A. It depends on the environment. In some cases the 2 amount of memory is less important than in other cases. It 3 depends on the application. 4 Q. But it's important certainly in some circumstances, 5 can we agree on that? 6 A. It's important in at least some situations. 7 Q. If memory is that important, don't you think somebody 8 would want to write it down at the ITU if it had been 9 discussed? 10 A. People probably did write it down. Again, this would 11 be the kind of thing that would not necessarily be discussed 12 in the context of drafting the standard. It's something 13 that folks would discuss at coffee breaks and lunch as 14 they're talking about problems that need to be solved and 15 ways to solve them. 16 Q. It sounds like a case that you wish someone had 17 thought of it first and wrote it down, but they didn't, 18 because you would have evidence of that if they did; right? 19 A. They did write it down. Mazzoni wrote it down. 20 Q. But not at an ITU meeting. The discussion we're 21 having here is you said someone discussed at the ITU 22 meeting; right? You don't have any evidence of that; right? 23 A. I wouldn't have evidence of conversations that took 24 place during coffee breaks. 25 Q. Now, the claims of TQ Delta patents all require	672 1 the deinterleaver from its memory; right? 2 A. Right. So it has a certain size memory already in 3 it, that's shared memory, and then when it is -- when it 4 knows the bit rate combination that it will be using, it 5 goes into its table and it looks up the parameters that it 6 needs for that particular bit rate combination. 7 Q. And those parameters come from this table, so the 8 table stored the memory; right? 9 A. That's correct. 10 Q. And those parameters, those aren't Reed Solomon coded 11 data bytes? 12 A. Those parameters are interleaver parameters. 13 Q. So they are not Reed Solomon message data bytes? 14 A. That's correct. 15 Q. When they're pulled out of that table from that 16 memory, that's at the time of installation; right? 17 A. That's what Mazzoni says. 18 Q. Mazzoni has probably a technician out there is what 19 you envision, technician out there installing your modem and 20 signed up for service A6, so he's going to set you for A6; 21 right? 22 A. That I believe is what we concluded when we discussed 23 Mazzoni, yes. 24 Q. And then the parameters are then frozen at that point 25 in time and those are the only parameters that are then
671 1 transmitting or receiving a message during initialization; 2 right? 3 A. They require a particular type of message. 4 Q. And Mazzoni does not describe any messages sent or 5 received during initialization; right? 6 A. That's correct, it does not address initialization at 7 all. 8 Q. It doesn't discuss any type of initialization, so it 9 certainly doesn't discuss exchanging messages for allocating 10 memory; right? 11 A. That's correct. 12 Q. And as I think you were saying, Mazzoni interleaver 13 and deinterleaver memory sizes are based on a set of 14 parameters stored in a table; right? 15 A. That's right. A transceiver has a table in which it 16 stores for each bit rate combination the parameters that 17 will be used for that bit rate combination. 18 Q. Okay. And so one set of those parameters are 19 retrieved from a table when size of the memory is set; is 20 that right? 21 A. I'm not sure I understand your question. When you 22 say the size of the memory is set, what do you mean? 23 Q. So when the size of the memory is going to be set by 24 Mazzoni's device, it will pull a set -- it will pull a 25 grouping of parameters, one from the interleaver, one from	673 1 going to be used by that Mazzoni device; correct? 2 A. Unless and until a different -- it's installed with a 3 different service, yes. 4 Q. And installed, so in other words, the technician 5 would have to come out there potentially and change that? 6 A. Correct. 7 Q. But that part is not even discussed in Mazzoni; 8 right? There is no discussion of changing after it's first 9 set; right? 10 A. I recall there is a discussion in Mazzoni about the 11 process that is undertaken when the memory is being split 12 between the interleaver and deinterleaver. I don't recall 13 any explicit discussion. Basically I think what you're 14 saying is hard reset and starting over with a different 15 service. 16 Q. Right. There is no changing then that's described in 17 Mazzoni's patent; right? 18 A. That's correct. 19 Q. No resetting them, no changing them to a different 20 value rate? 21 A. Correct. 22 Q. It doesn't even describe the process of sending a 23 technician out there; right? 24 A. No, it just says installation generally, and that's 25 one of the reasons that it's my opinion that someone would

1 **find Mazzoni in that sense very limiting.**
2 Q. Right. It's very limiting if its memory is froze?
3 A. **Right.**
4 Q. And certainly at that time, I think devices now you
5 can -- they ship it to you in a box, you can set it up
6 yourself, but certainly back at Mazzoni's time, it involved
7 a technician going out and setting it up; right?
8 A. **I don't think that's true. Because I got DSL at my**
9 **house right around maybe like 2002, I want to say.**
10 Q. But you didn't have any ability to change your
11 interleaver or deinterleaver size?
12 A. **No, of course not. The transceiver figures that out.**
13 Q. But again, just back to, there is no initialization
14 messages of any kind described in Mazzoni?
15 A. **That is correct.**
16 Q. So certainly no memory sharing message?
17 A. **That's correct.**
18 Q. Now, do you understand that Dr. Cooklev's opinion is
19 that adding LB-031 messages to Mazzoni makes Mazzoni
20 inoperable?
21 A. **I understand that to be his position, yes.**
22 Q. His position is that it would break Mazzoni, right?
23 A. **That is his position as I understand it.**
24 Q. During the deposition we agreed that we call that the
25 Mazzoni problem; right?

1 A. **You called it the Mazzoni problem. You can call it**
2 **whatever you like. I don't think there is a problem, but...**
3 Q. And so on the issue of whether there is a problem --
4 so he said that it was broken essentially because LB-031
5 would require Mazzoni to try to use more memory than it
6 actually has; right?
7 A. **That is my understanding of what his opinion was,**
8 **yes.**
9 Q. And roughly the numbers are if Mazzoni has
10 approximately 26,000 bytes of total memory, remember that's
11 about what Mazzoni has?
12 A. **I think that's right.**
13 Q. And that's based on the highest asymmetrical service;
14 right?
15 A. **It's based on the maximum total, so some of upstream**
16 **and downstream the maximum total bits, right.**
17 Q. It was about 26,000 total bytes that Mazzoni had
18 available; right?
19 A. **I don't remember if it was 26,000 or 28,000, but**
20 **something around there.**
21 Q. Let's go with 28,000. Let's go with 28,000 total
22 bytes that Mazzoni has available, and the messaging, if you
23 do what LB-031 tells you to do, you wind up needing 36,000
24 bytes; right?
25 A. **I don't agree.**

1 Q. I'm sorry. I may have misspoke. If you do what
2 LB-031 explicitly tells you to do, you would wind up needing
3 36,000 bytes of memory; right?
4 A. **I disagree with that.**
5 Q. But you didn't disagree with that when you wrote your
6 opinion; right? When you wrote your opinion, your opinion
7 was the way you fix it is to add more memory; right?
8 A. **Well, as I think we explored during my deposition, I**
9 **understood Dr. Cooklev's opinion as captured in his rebuttal**
10 **report to be that Mazzoni could not be modified to include**
11 **more memory.**
12 Q. But wait a minute, that's not what your response was.
13 We can take a look at your expert report. Your response was
14 I think you called Dr. Cooklev's arguments specious, and you
15 said, you used specious, I don't know if that's an expert
16 word, but in any event, you said specious, and you said
17 because you can simply add more memory and that was your
18 exclusive response?
19 A. **That's correct.**
20 Q. And so the idea then is your solution is I'm going to
21 add more memory and that's how I'm going to solve the
22 problem; right?
23 A. **That's how I was going to solve the problem I**
24 **understood him to have posed.**
25 Q. I noticed you did this earlier, you were talking

1 about what is the motivation to combine LB-031 with Mazzoni.
2 You understand by the way -- I'm sorry, that an expert
3 witness in order to claim that a combination renders a claim
4 obvious, they have to identify a motivation for one of skill
5 in the art to combine those references; right?
6 A. **That is my understanding, yes.**
7 Q. And the motivation you provided for combining was
8 that both Mazzoni and LB-031 are concerned with limiting the
9 size of memory used for interleaver and deinterleaver;
10 right? Does that kind of summarize your reason for why you
11 combine them?
12 A. **That's among the reasons, yes.**
13 Q. But that's directly contrary to your solution of just
14 adding more memory, isn't it?
15 A. **The way I understood Dr. Cooklev's argument was that**
16 **--**
17 Q. No, no, it is contrary; right? I would like to know,
18 is that contrary? You're just going to add more memory?
19 The reason you put them together was to limit the amount of
20 memory because they both allegedly want to limit memory,
21 then increasing the memory is contrary; right?
22 A. **Increasing the memory is contrary to that.**
23 Q. Okay. Thank you.
24 Now, I want to move on to -- the issue of shared
25 memory. I just want to -- it doesn't sound like -- let me

678 1 ask it this way. Does 2Wire contest that the accused 2 products have shared memory as construed by the Court? 3 A. I don't know. 4 Q. Do you have an opinion of whether shared memory is 5 used in the accused products? 6 A. I did not investigate whether the accused products 7 used shared memory. 8 Q. So Dr. Cooklev said that they do use shared memory, 9 you know that; right? 10 A. I do know that. 11 Q. And your job was to rebut his opinions on equipment? 12 A. Correct. 13 Q. But you don't have an opinion on whether they include 14 shared memory; right? 15 A. I don't. 16 Q. The reason you don't is because you never 17 investigated the accused products; right? 18 A. Well, that would be the sort of investigation that 19 would require source code analysis, and as I said earlier, I 20 rely on Dr. Walker for the source code analysis. 21 Q. And you think Dr. Walker provided an opinion on 22 whether there was shared memory or not? 23 A. I don't think he did. 24 Q. So nobody on your side, nobody responsible for 25 rebutting the expert opinions on our side provide any expert	680 1 memory; correct? 2 A. I did not. 3 Q. And in fact, you don't -- here is another one. 4 Pretty critical thing is how much memory do the accused 5 products actually use, because there was an argument over 6 minimum and maximum. You don't know how much memory the 7 accused products actually use for their interleaver and 8 deinterleaver, do you? 9 A. I relied on Dr. Walker's analysis for the source 10 code. 11 Q. He never provided an opinion for how much memory they 12 actually use; right? 13 A. They provided an opinion that they do not use the 14 max_delay_octet values. 15 Q. At your deposition I asking you whether you had any 16 opinion on how much memory was actually used, and you said 17 you don't; correct? 18 A. Correct. 19 Q. So when you had all these slides up here and you're 20 suggesting that $1 - D - 1 \text{ over } 2$ is the minimum, 21 you have no basis whatsoever for saying that the accused 22 products used one single bite more than another; correct? 23 A. I have Dr. Walker's analysis. 24 Q. But you have no opinion, right, you have no opinion, 25 you agree with me that your opinions did not include any
679 1 testimony that there was no shared memory; right? 2 A. I did not opine that there is or is not shared 3 memory. 4 Q. And the reason you didn't do that is because you 5 never reviewed the accused products; right? 6 A. I did not review the accused products. That would 7 not have told me whether they had shared memory. 8 Q. And why not? I thought you just said you could 9 review the source code and figure that out? 10 A. I could review the source code, but that was not part 11 of my task to review the source code. 12 Q. But I think I'm speaking more generally here. More 13 generally, you never investigated how the accused products 14 work, how they are made up, you didn't investigate the chip 15 and how that was made up; correct? 16 A. I did not. My understanding of my role and my task 17 is to rebut what Dr. Cooklev had said, not to prove that the 18 products don't infringe. 19 Q. So you didn't provide any -- but I thought you said 20 that you were the one that was going to provide the 21 non-infringement opinion? 22 A. I did provide a non-infringement opinion. 23 Q. Okay. Fair enough, you provided a non-infringement 24 opinion, but I'm trying to figure out what the basis are for 25 that. So you didn't investigate whether there was shared	681 1 unless of how much memory was actually used; right? 2 A. My opinions are based on Dr. Walker's analysis that 3 those max_delay_octet values are not used. 4 Q. Dr. Jacobsen, I understand you're saying they were 5 based on, right, but there's nothing in your reports 6 claiming non-infringement that states how much memory is 7 actually used; right? 8 A. Correct. 9 Q. So if you're relying on Dr. Walker and you wanted to 10 provide an opinion on how much was actually used, don't you 11 think you would have taken that from his reports if it was 12 there and put it in your report? 13 A. Yes. 14 Q. Okay. But you didn't? 15 A. Right. 16 Q. Okay. So when you were describing this idea that $1 - D - 1 \text{ over } 2$ 17 is the minimum not the maximum, you had no basis for saying that the accused 18 products actually use more than that; right? 19 A. I had Dr. Walker's analysis. 20 Q. Well, we just went through that. You personally 21 don't have any indication, certainly not your expert report, 22 that there is one single byte more than $1 - D - 1 \text{ over } 2$ 23 D -- I'm sorry. $1 - D - 1 \text{ over } 2$ 24 bytes of memory used by the accused products; right? 25

682 1 A. Well, I'm not sure that's true because Dr. Walker's 2 analysis as he showed -- when he testified showed that the 3 amounts of memory used are more than that. There was the 4 equation that he provided. 5 Q. Okay. So there was an equation, but you don't have 6 any evidence from that equation that it's using more bytes 7 of memory than I minus one, D minus one over two; right? 8 A. That equation showed that it would be using more than 9 I minus one. 10 Q. I'm sorry. I misspoke. So the distinction is that 11 it's using more memory for the interleaver memory than 12 deinterleaver memory; right? You don't have any evidence 13 that that is using more interleaver or deinterleaver memory; 14 correct? 15 A. Is your question -- I don't understand your question. 16 Are you comparing the amount used for the interleaver versus 17 the amount used for the deinterleaver? 18 Q. No. No. No. No. I'm limiting the memory to the 19 amount -- the amount that's actually used for the 20 interleaver memory and the deinterleaver memory. Okay. 21 And the distinction I'm making -- I'm sorry, 22 because I think it's a distinction you made. You said that 23 you could potentially use some of the same block of memory 24 for, I think you called it, head room. 25 A. Yes.	684 1 So if that's going to be placed into the same 2 block of memory as an interleaver memory and a deinterleaver 3 memory, you would agree with me that those pointers are not 4 the interleaver deinterleaver memory itself; right? 5 A. You're using this term interleaver deinterleaver 6 memory, and I'm not a hundred percent sure what you're 7 talking about because that term is not used in the asserted 8 patent. 9 Q. Okay. But you were the editor of the book; right? 10 A. Correct. 11 Q. Okay. And one of your roles in editing the book was 12 to go through it and make sure there was nothing inaccurate 13 in it; right? 14 A. Well, there's a limit to how much of that you can do 15 in a book of length, but -- 16 Q. Okay. But in that book, you understand that -- and 17 we looked at this during your deposition, you understand 18 that there's a passage in there that distinguishes the 19 interleaver deinterleaver memory itself from the memory 20 that's used to store pointers; right? 21 A. I recall that that was the terminology used in that 22 chapter. Yes. 23 Q. Okay. And you were -- I mean, Mr. Schuman said that 24 you literally wrote the book. 25 Are you going to claim some ownership of that
683 1 Q. Okay. Head room is not performing the function of 2 interleaving; correct? 3 A. It's -- it depends on how you define the function of 4 interleaving. The purpose of head room is in case you need 5 more buffer space as you're interleaving or deinterleaving. 6 Q. Right. But interleaving and deinterleaving can we 7 agree is the function of storing Reed-Solomon coded data 8 bytes for the purpose of delaying them, and therefore, 9 spacing them out in time? 10 A. That's -- that is what interleaving is. But the 11 amount of memory required to do that and, as the claims 12 recite, is not just limited to the amount of memory used 13 specifically to store Reed-Solomon coded data bytes. 14 Q. Well, no. The claims talk precisely about that; 15 right? They talk about allocating memory to interleaver 16 deinterleaver Reed-Solomon coded data bytes; right? 17 A. In the allocating limitations, they do. In the 18 message limitation, they don't. 19 Q. Okay. So you're talking about -- you said head room. 20 It's kind of a generic term, and maybe I'll ask you about 21 what that means. 22 But let's talk about a few things that you might 23 have meant. So let's say that by head room you meant you're 24 going to store some memory pointers, so the addresses for 25 memory pointers. Right?	685 1 statement? 2 A. I -- as I said when I testified, I edited the books. 3 I wrote particular portions of them, and then I edited other 4 portions of them. 5 Q. And you wouldn't purposely let incorrect statements 6 go into those books, would you? 7 A. Not intentionally, no. 8 Q. All right. Now, I want to pull up one of your slides 9 here. If we could have slide 15 of Dr. Jacobsen's 10 demonstratives. 11 And do you still have that available to you, 12 Dr. Jacobsen? 13 A. I believe so, yes. 14 Q. Okay. So you showed a memory here; right? You were 15 showing a memory that -- and I think this was on the 16 deinterleaving side; right? 17 A. That's right. 18 Q. Okay. And so let's just agree that if the equation 19 was I minus one, D minus one over two, and I think the 20 interleaver block size you used was four; right? 21 A. Correct. 22 Q. And the interleaver depth you used was two. I'm 23 sorry, interleaver depth you used was three? 24 A. I think that's correct. Yes. 25 Q. Okay. So I minus one times D minus one over two

686 1 would be three times two is six; right? 2 A. Yes. 3 Q. I'm sorry. Yeah. 4 I'm sorry. I minus one times D minus one; 5 right? 6 A. Six. 7 Q. Okay. Six. Right. 8 So but you're showing 12 bytes here in the 9 memory; right? 10 A. That's right. 11 Q. Okay. But this is not a triangular interleaver; 12 right? 13 You have a square here; right? This is not a 14 triangular interleaver? 15 A. Correct. As I explained when I was talking about 16 these slides, this is the block interleaver because it's 17 simple and easier to understand. 18 Q. Right. So this is what -- this block interleaver 19 would actually require 12 bytes of memory to do what you 20 did; right? 21 A. It might require a little less than 12 only because 22 you can send one. 23 Q. Okay. But the one you illustrated was going to 24 require 12 bytes of memory; right? 25 A. Approximately.	688 1 that's roughly -- and this isn't exactly how it's going to 2 look, but the concept of a triangular interleaver is you 3 need half the amount of memory that you would need for a 4 block interleaver; right? 5 A. I'm not sure I'm following you a hundred percent 6 because what you're talking about is the kind of an 7 implementation that you would use for a convolutional 8 interleaver, and what I illustrated here as I mentioned was 9 a block interleaver. 10 Q. Right. But the VDSL standard uses a convolutional 11 interleaver; right? The VDSL2 standard uses a convolutional 12 interleaver? 13 A. All of them use convolutional interleavers. 14 Q. All of them. And in fact, the way Broadcom does that 15 is by using a triangular convolutional interleaver; right? 16 A. I believe they said that the data sheet says it's a 17 triangular buffer. 18 Q. Okay. Now, one last thing here. If we could pull up 19 Figure 1 of the '882 patent. This is JTX 2. 20 So I just want to take you through this figure 21 here. So this is an embodiment of the patent; correct? 22 A. I would believe that the patent describes this as an 23 exemplary embodiment. 24 Q. So this is an example embodiment of the invention 25 described in the patent; correct?
687 1 Q. Okay. So now let's -- and before I do this, let me 2 ask you: Do you understand that the accused products -- 3 you've been in Court here. We put up some information from 4 Broadcom, the company that makes the chips. And you 5 understand that their interleavers and deinterleavers are 6 described as triangular implementations? 7 A. I believe that the data sheets describe a triangular 8 first in, first out buffer. 9 Q. Okay. So let's take a look at what happens when you 10 use a triangular implementation. 11 MR. MCANDREWS: Josh, if we could do that, 12 please. 13 BY MR. MCANDREWS: 14 Q. Okay. So see the triangle up there, and that's 15 roughly why it's called the triangular interleaver, right, 16 because there's different amounts of delay per row; correct? 17 A. I'm not sure what you've got shown here. 18 Q. Well, we've X'd out six of them. The lower left one 19 should be X'd out, but we were trying to deal with this on a 20 break, so we missed one. 21 So the C1 at the bottom there should be gone, 22 and so that would give us six. It would give us four purple 23 and two green; right? 24 A. That's what your drawing shows. 25 Q. Okay. So see the triangle there, so the idea is	689 1 A. I believe so. A functional diagram is what he calls 2 it. 3 Q. And this is a transceiver? 4 A. That's what it says. 5 Q. Okay. And if you recall, the claims of the patents 6 claim a transceiver comprising? 7 A. Correct. 8 Q. Okay. The '882 patent does, in any event? 9 A. I believe so, yes. 10 Q. Okay. And you see in this block diagram, you see 11 that there's a transmitter portion 200 there? 12 A. Yes. 13 Q. Okay. And you see that there's a receiver portion 14 300? 15 A. I see that. 16 Q. Okay. And so that's called the transmitter portion. 17 That's the transmitter portion of the transceiver; right? 18 A. That's what it says. 19 Q. And there's a receiver portion of the transceiver? 20 A. That's what it says. 21 Q. Okay. Now, let's focus in on the transmitter 22 portion. The framer, the coder, and the interleaver, those 23 are not called portions, are they? 24 A. In the diagram are you asking me? 25 Q. In the diagram, let's start there.

690 1 A. They are not labeled portions in the diagram. 2 Q. Okay. Would it surprise you to know that at no place 3 anywhere in the patent specification is the framer, the 4 coder, or the interleaver described as a portion? 5 A. I wouldn't be surprised or unsurprised. 6 Q. Okay. And you didn't look at that to form the basis 7 for your opinions, did you? 8 A. No. 9 Q. Okay. And just real quick for the receiver portion, 10 you don't see that the deframer, the decoder and the 11 deinterleaver are called portions, either; right? 12 A. They are not labeled as portions in this figure. No. 13 Q. And again, it's not going to surprise you if at no 14 point in the patent specification is the deframer, decoder 15 and deinterleaver described as a portion? 16 A. I wouldn't be surprised or not surprised. 17 Q. Okay. But again, you didn't rely on that to form the 18 basis for your opinions? 19 A. That's correct. 20 Q. Okay. Now, if we could pull up the last page of her 21 presentation, Page 68, please. So during your presentation, 22 you were talking about you couldn't believe that the patent 23 specification is consistent with the -- with the way the 24 claims were originally written. 25 Right? That's what the purpose of this slide	692 1 right? 2 A. As I explained when I was testifying, I read the file 3 history, including this paragraph. 4 Q. No. No. No, but I'm talking about this. You were 5 relying on this; right? What you did is you listed a couple 6 of pieces of evidence. 7 This is one of them; right? 8 A. Yes. 9 Q. And this one here is the only one -- this what we're 10 looking at on the slide is the only one that you cited for 11 support that one of skill in the art reading the patent 12 specification would actually think that the inventor was 13 trying to claim a deinterleaver that transmits and an 14 interleaver that receives; right? 15 A. I relied on this paragraph in support of my opinion. 16 Yes. 17 Q. Okay. Now, if we could pull up JTX 40, please. Now, 18 we're going to look at a piece of this here, but you agree 19 that all of the accused products receive an O-PMS message; 20 correct? 21 A. That's correct. 22 Q. Okay. And you agree that the O-PMS message that it 23 receives is the one that's defined in the VDSL2 standard; 24 correct? 25 A. As far as I know, yes.
691 1 was? 2 A. That's right. 3 Q. You were trying to say that there's disclosure here 4 that would tell one of skill in the art that the inventors 5 were actually trying to describe a device that transmitted 6 from the deinterleaver; right? 7 A. Correct. 8 Q. And that received from the transmitter; right? 9 A. I would have to look at the language. I'm not 10 comfortable saying yes or no to your characterization 11 without actually seeing the claims because they're -- 12 Q. Okay. But this is what you relied on; right? 13 A. Correct. 14 Q. You highlighted these two pieces? 15 A. Yes. 16 Q. Let me read the bottom. Similarly, one or more 17 functional portions of the system could be distributed 18 between a modem and an associated computing device. So what 19 you were saying here is that, yeah, you might put a portion 20 here and a portion there, but don't you agree with me that 21 the patent specification, the only thing it's describing as 22 a portion is the entire receiver? 23 A. I did not look. 24 Q. So that doesn't form the basis for your opinion that 25 you believe that it's not a simple typographical error;	693 1 Q. Okay. And do you agree that the O-PMS message 2 specifies the portion of shared interleaver memory that the 3 VTU-R can use to interleave the downstream data? 4 A. The O-PMS message specifies the information that the 5 VTU-R can then use to determine how much of its shared 6 memory -- if it's using shared memory, how much of that 7 memory is left for deinterleaving. 8 Q. Can we go to Table 12 and do we have a page? Is it 9 263, possibly? 10 Yes, and if you could zoom in on the upper half 11 all the way down through row 11 there approximately. Yeah. 12 Thank you very much. Can you just show a little 13 more of the screen here? 14 (Discussion held off the record:) 15 MR. MCANDREWS: Oh, no. I'm sorry. Something 16 was cut off. 17 There we go. Oh, that's perfect. Thank you. 18 BY MR. MCANDREWS: 19 Q. So what you're suggesting -- I think what you're 20 suggesting is that the second sentence here that's referring 21 to the O-PMS message, it says it also specifies the portion 22 of shared interleaver memory that the VTR can use to 23 deinterleave the downstream data; right? That's what you 24 were just referring to? 25 A. I thought that was the sentence you were referring

694 1 to, yes. 2 Q. Okay. But your response there, you're trying to 3 suggest that somehow this is not based on the 4 max_delay_octet downstream field; right? Is that your 5 suggestion? 6 A. Yes. 7 Q. Okay. And instead, you're suggestion is that it's 8 actually the LP0 and LP1 field that that sentence is talking 9 about; right? 10 A. Correct. 11 Q. Okay. So let's start with one step. The sentence 12 immediately before, you don't have to highlight, the 13 sentence immediately before says the O-PMS message conveys 14 the initial PMS-TC parameter settings that shall be used in 15 the upstream direction during Showtime. Do you see that? 16 A. I do. 17 Q. What that is referring to is row six and row seven, 18 field six and seven, that's LP0 and LP1? 19 A. Those are among the PMS-TC parameters that would be 20 used. 21 Q. You're saying among, but those are the ones that 22 include the I and the D for the upstream interleaver of the 23 CPE device; correct? 24 A. That's correct. 25 Q. There are no other fields here of any kind that	696 1 memory that can be used. 2 Q. So the sentence is just surplus, someone put in a 3 sentence that talked about shared interleaver memory using a 4 downstream direction, you're saying it doesn't even apply to 5 memory now? 6 A. I'm saying it an informative statement that says the 7 person reading this document that once I receive the O-PMS 8 message the QR has all of the information that it needs in 9 order to figure out, if it's using shared memory, how much 10 of it is left for the deinterleaver. 11 Q. But it says it specifies, you're saying you have to 12 do some sort of math equation on the other side. How could 13 it specify if you have to do a math equation, because didn't 14 earlier you say that the central office doesn't know how 15 much memory is even available over there? 16 A. The standard specifies minimum total amounts of 17 memory that have to be used in the profile table. 18 Q. Okay. So your position, I just want to clarify, your 19 position is that both the first and the second doesn't refer 20 to the LP0 and LP1 fields? 21 A. Well, the first sentence refers to more than just LP0 22 and LP1. 23 Q. Let me change the question. With respect to what 24 this case is all about, interleaver and deinterleaver and 25 memory size for that, the only thing that that first
695 1 include the I and the D for the upstream interleaver; 2 correct? 3 A. Correct. 4 Q. So that's the first sentence. Now, the second 5 sentence begins, it also. It also seems like something in 6 addition to that; right? But you're suggesting it's the 7 very same thing, isn't that true, you're suggesting that 8 it's also the LP0 and the LP1 that that second sentence 9 refers to; right? 10 A. Yes. 11 Q. You are? Okay. I just wanted to make sure that was 12 your position. 13 But that sentence, I think the reasonable way to 14 read that, though, and I know you're not going to agree, 15 however, is that it's the max_delay_octet downstream because 16 it's only that field that has anything to do with the 17 downstream deinterleaver; right? 18 A. Well, no. Inferentially if shared memory is being 19 used then the I and the D values that are being used 20 upstream will affect how much memory is left for the 21 downstream. 22 Q. You have to infer it and affect it, but it does not 23 specify an amount, it does not specify an amount to 24 deinterleaver the downstream data; right? 25 A. None of the parameters here specify an amount of	697 1 sentence can refer to is the LP0 and LP1 field; right? 2 A. If you're going to limit PMS-TC parameter settings to 3 only interleaver and deinterleaver settings which is a small 4 subset of those parameter settings, then yes. 5 Q. Let's say it is all of them, it is all of them for 6 the upstream direction; right. 7 A. Well, all of these are for the upstream direction 8 except for max_delay_octet downstream. 9 Q. Exactly. And that's what this second sentence refers 10 to; right? I'm actually reading this, it says can be used 11 to de-interleave the downstream data stream; right? 12 A. But that's not conveyed by -- 13 Q. Isn't that what it says, that sentence refers to the 14 deinterleaver in the downstream direction; right? 15 A. That sentence refers to the deinterleaver in the 16 downstream direction. 17 MR. MCANDREWS: Okay. Thank you. Pass the 18 witness. 19 THE COURT: Redirect. 20 MR. SCHUMAN: Briefly, Your Honor. 21 REDIRECT EXAMINATION 22 BY MR. SCHUMAN: 23 Q. I want to follow-up on a few things that you were 24 discussing with Mr. McAndrews. 25 During the beginning of Mr. McAndrews'

698 1 cross-examination he was asking you some questions about 2 your friends at 2Wire. Do you remember that? 3 A. I do, yes. 4 Q. He asked you about Ben Miller? 5 A. Yes. 6 Q. Prior to arriving here in Wilmington for this trial, 7 when was the last time you saw Mr. Miller, approximately? 8 A. Before I left 2Wire in 2006. I haven't seen him 9 since. 10 Q. Mr. McAndrews was asking you a few questions about 11 the discussions at the ITU meetings around the possibly of 12 using shared memory in VDSL2. Do you recall that? 13 A. I do. 14 Q. He mentioned a few names, people that you recall 15 discussing that concept with, Andy Desky? 16 A. Correct. 17 Q. Who is he? 18 A. He was an engineer from I believe it was Catina 19 Networks when we were done, he was very involved in 20 interleaver memory discussions. 21 Q. Somebody from Infineon, the specific name you 22 couldn't remember? 23 A. Yes. Yes. 24 Q. How about Mr. Modlin, did you ever speak with 25 Mr. Modlin at the ITU meetings around this time about using	700 1 will set out sort of an executive summary of the claimed 2 invention. 3 Q. Do you recall some questions from Mr. McAndrews about 4 whether there were any devices out there that used shared 5 memory for interleaver/deinterleavers at the time of the 6 patents, do you remember that? 7 A. I do remember that. 8 Q. Can you read please the portion that's on the screen 9 and maybe just the first sentence? 10 A. Sure. "The device according to the invention may 11 include a coding decoding stage (generally referred to by 12 those skilled in the art as a channel coding / decoding stage) 13 including interleaving means and de-interleaving means." 14 Q. So I understood your testimony in response to 15 Mr. McAndrews' questions to be you weren't aware of a 16 specific device out there that had shared memory for 17 interleaver/deinterleaver, but you also weren't willing to 18 exclude the possibility that such a device existed? 19 A. Correct. I can't possibly know what other people 20 were doing in their implement. 21 Q. This portion of the summary of the invention goes on 22 and talks about interleaving means and de-interleaving 23 means. Is it your understanding that Mazzoni, that this 24 device of Mazzoni including interleaving and de-interleaving 25 functions?
699 1 shared memory in the context of VDSL2? 2 A. Yes, definitely. 3 Q. And Mr. Modlin, that's the author of the LB-031 4 reference; correct? 5 A. Correct. 6 Q. Is everything that everybody speaks about at these 7 ITU meetings that happen all around the world, are they all 8 reported somewhere in a written document? 9 A. No, the participants in the ITU meetings are able to 10 take notes as they issue or not take notes. And I tended to 11 take very thorough notes because that's just how I am. And 12 others took no notes. So there was no -- the initial 13 meeting report was generally super short and there wasn't 14 much to it. 15 Q. I want to turn to the Mazzoni patent prior art. 16 JTX-56 in your binder. 17 A. Okay. 18 Q. I want to go to column two of the specification. And 19 starting at line three, can you blow up that paragraph. So 20 Dr. Jacobsen, we're in the summary of the invention portion 21 of the specification of Mazzoni. Can you just explain 22 briefly for the members of the jury what the summary of the 23 invention portion of a patent specification is to your 24 understanding? 25 A. Sure. As I understand it, this is where the inventor	701 1 A. Yes, definitely. 2 Q. And I think there were some question by Mr. McAndrews 3 about whether Reed Solomon coded bytes were stored in the 4 interleaver/deinterleaver. Do you see any reference to Reed 5 Solomon bytes in the summary portion of Mazzoni? 6 A. I do. If you scroll down to line 25, Mazzoni refers 7 to protecting the transmitted data stream from noise by 8 using Reed Solomon. 9 Q. In the summary of the invention section, Mazzoni, 10 Dr. Jacobsen, do you see any reference to the use of a 11 convolutional interleaver? 12 A. Yes. If you scroll down a little further to oh, 13 roughly line 37. So we got Reed Solomon and interleaving 14 means adapting to effect convolutional interleaving. 15 Q. Is convolutional interleaving the kind of 16 interleaving that's in the VDSL2 standard? 17 A. Yes. 18 Q. During cross-examination Mr. McAndrews was asking you 19 some questions about this combination of LB-031 and Mazzoni. 20 Do you remember those questions? 21 A. I remember some of them, yes. 22 Q. And he asked you to agree that it would be 23 inconsistent with the memory reducing purpose of Mazzoni to 24 increase the memory to account for the messaging scheme of 25 LB-031. Do you remember those questions?

702 1 A. I remember them, yes. 2 Q. And I think you were explaining in response to the 3 last question when he said thank you why this is not 4 inconsistent with your opinion about LB-031 and the Mazzoni, 5 can you please finish your answer for the jury? 6 A. Sure. So the benefit of expanding the memory in any 7 of these references would be that you could support a wider 8 range of services and a higher total bit rate. If you 9 maintained the same size memory and added the messaging 10 scheme you would increase the flexibility of the approach. 11 Q. Thank you. 12 Just a few more questions for you. You recall 13 some questions from Mr. McAndrews about whether you actually 14 examined any of the accused 2Wire modems? 15 A. Yes. 16 Q. My question for you is, is the basis for your 17 non-infringement opinion in this case based on your 18 understanding of how the messages in the standard work or on 19 your personal examination of the accused products? 20 A. It's on how the messaging in the standard works. 21 Q. I want to direct your attention, Dr. Jacobsen, to 22 PTX-2. This is the '882 patent, and particularly figure 1 23 which Mr. McAndrews had on the screen. This is the figure 24 representing the transceiver of the Tzannes patents; 25 correct?	704 1 have to take the binders away. That's somebody else's job. 2 THE WITNESS: Okay. Thank you. 3 COURT CLERK: Please state and spell your full 4 name for the record. 5 THE WITNESS: Gong-San Yu. G-O-N-G-S-A-N, last 6 name Y-U. 7 Gong-San Yu, Ph.D., was examined and testified 8 as follows: 9 MR. PRANGE: Your Honor, ask for a side-bar, 10 please. 11 THE COURT: Yes. 12 (Side-bar discussion:) 13 MR. PRANGE: So I was just handed these two in 14 the preparation for the demonstratives. 15 THE COURT: These are demonstratives that you're 16 intending to use with Dr. Yu? 17 MR. SCHUMAN: Can you flip this one so I make 18 sure -- I think the answer is yes, you said two. 19 THE COURT: Three. 20 MR. SCHUMAN: There is three. 21 MR. PRANGE: I said Dr. Yu. Dr. Yu, I don't 22 believe these were disclosed to us at the appropriate way in 23 the pretrial order. He's not an expert witness, also. 24 THE COURT: Okay. So I have heard the expert 25 witness thing. What about the disclosure business?
703 1 A. Correct. 2 Q. What is figure 1? 3 A. Well, according to the patent figure 1 is a 4 functional block diagram illustrating an exemplary 5 transceiver according to this invention. 6 Q. Can you explain to the jury, please, what a 7 functional block diagram is? 8 A. Yes, a functional block diagram is a diagram that 9 illustrates functions of a device. It doesn't illustrate 10 how they're implemented or what kind of hardware or software 11 implements them, it's a kind of this block does this, this 12 block does that. 13 Q. Does the fact that all the components of the 14 transceiver in figure 1 are depicted in one rectangle mean 15 that all the components in a real device necessarily have to 16 be in one place? 17 A. Not according to the description in the patent itself 18 which says that they might not all be together, they might 19 be some distance from each other. 20 MR. SCHUMAN: Thank you, Dr. Jacobsen. 21 THE COURT: All right. Dr. Jacobsen, thank you. 22 You may step down. Watch your step. 23 THE WITNESS: Thank you, Your Honor. 24 MR. SCHUMAN: Your Honor, 2Wire calls Dr. Yu. 25 THE COURT: All right. Dr. Jacobsen, you don't	705 1 MR. SCHUMAN: These were the demonstratives that 2 I used with Dr. Almeroth yesterday, so I think I should be 3 allowed to use them with Dr. Yu. If I disclosed them 48 4 hours in advance, they would have had them before 5 Dr. Almeroth's cross-examination. Everybody has already 6 seen these including Mr. Prange and TQ Delta's counsel 7 yesterday during Dr. Almeroth's cross-examination. 8 THE COURT: Is that right? 9 MR. PRANGE: The first time I saw these was 10 yesterday for Dr. Almeroth's cross-examination. 11 THE COURT: Okay. 12 MR. SCHUMAN: I'm not representing to be clear 13 that they were provided prior to yesterday's 14 cross-examination of Dr. Almeroth. They were disclosed 15 yesterday during Dr. Almeroth's cross-examination. 16 THE COURT: All right. So besides for these 17 three pages, are you expecting to show Dr. Yu anything in 18 connection with his testimony? 19 MR. SCHUMAN: Potentially two disclosed excerpts 20 of Broadcom source code. 21 THE COURT: Okay. All right. Well, given -- 22 and so I guess the question is in terms of the pretrial 23 order, you were supposed to be disclosing this -- today is 24 Wednesday -- on Monday. 25 MR. SCHUMAN: Well, that's Mr. Prange's -- I

706 1 think that's Mr. Prange's position. My position is these 2 were slides that did not need to be disclosed under any 3 provision of the protective order in order to use them 4 yesterday with Dr. Almeroth on cross-examination. 5 THE COURT: Right. But that's one thing to use 6 them with Dr. Almeroth on cross-examination. It's another 7 thing to use them with Dr. Yu on direct examination. Right? 8 MR. SCHUMAN: I agree that that's a different 9 thing. My point is just that there is no -- they have been 10 disclosed yesterday. They were not -- 11 THE COURT: Right. But to use them on 12 somebody's direct examination you were supposed to have 13 disclosing them on Monday. Right? 14 MR. SCHUMAN: I think under the protective order 15 that would be correct. 16 THE COURT: When you say the protective order, 17 you mean the pretrial order? 18 MR. SCHUMAN: I meant the pretrial order. 19 I don't see the prejudice when they saw them 20 yesterday, certainly had all last evening and there has 21 already been testimony including from Dr. Almeroth regarding 22 the content of these three slides. 23 THE COURT: And in terms of you were going to 24 use them with Dr. Yu, that's something that Mr. Prange, that 25 his whole side has only learned just now, in other words,	708 1 THE COURT: I'm going to sustain the objection. 2 While it's hard for me to think that there is overwhelming 3 prejudice here, I do think that the pretrial order for 4 somebody who is doing direct, disclosing it yesterday would 5 not have been timely, and so -- and I also, I mean, I am 6 concerned about exactly how Dr. Yu is supposed to be 7 testifying, and I think you could have him testify without 8 these. All right? 9 MR. SCHUMAN: Thank you, Your Honor. 10 MR. PRANGE: Thank you, Your Honor. 11 (End of side-bar.) 12 MR. SCHUMAN: Ready to proceed, Your Honor. 13 THE COURT: Yes. 14 MR. SCHUMAN: Thank you. 15 DIRECT EXAMINATION 16 BY MR. SCHUMAN: 17 Q. Good afternoon, Dr. Yu. 18 A. Good afternoon. 19 Q. Can you please introduce yourself to the jury? 20 A. My name is Gong-San Yu. I work for Broadcom. 21 Q. Sorry. I didn't understand that last part. Can you 22 say it again? 23 A. My name is Gong-San Yu. I work for Broadcom, 24 Broadcom Corporation since the year 2000. 25 Q. Since the year 2000?
707 1 they saw them when you did on Dr. Almeroth's cross, but in 2 terms of their using them, so do you need to use these? 3 MR. SCHUMAN: I don't know. I haven't met 4 Dr. Yu. Let me clarify. I don't know. I have not met with 5 Dr. Yu prior to his testimony today. 6 THE COURT: Okay. 7 MR. SCHUMAN: I met Dr. Yu at deposition a 8 year-and-a-half ago. 9 MR. PRANGE: It was exactly a year ago, 10 actually. 11 THE COURT: So I guess the reason why I'm kind 12 of inclined -- so what's the harm, Mr. Schuman raised, is 13 there some prejudice to you here? 14 MR. PRANGE: I think the prejudice is for one, 15 it was not disclosed under the requirements of the pretrial 16 order which is 48 hours ago on Monday. What they did 17 disclose was a long list of source code and that was it. 18 These were never disclosed. And that's intended for us to 19 allow to prepare for what Dr. Yu is going to do or what he 20 is going to say. The other prejudice is it communicates to 21 the jury that because of the use with Dr. Almeroth, and 22 similar types of presentations are used with other experts 23 it gives it some potentially greater footing than 24 potentially they may say with other fact witnesses which is 25 what he's supposed to be here for.	709 1 A. Right. 2 Q. Thank you, Dr. Yu. What is your title at Broadcom? 3 A. My official title is called distinguished engineer. 4 Q. And what types of products do you work on at 5 Broadcom? 6 A. I work on the CPE chip. Broadcom CPE chip in the DSL 7 area. 8 Q. Thank you. Can you briefly describe your educational 9 background for the members of the jury? 10 A. I hold a Ph.D. degree from the University of Arizona 11 in electrical and computer engineering. I have a master's 12 degree in electrical engineering from the National Taiwan 13 University. And I have a Ph.D. from the National Chao-Tung 14 University, two of the top universities in Taiwan. 15 Q. Do you design DSL CPE chips, Dr. Yu? 16 A. Yes, I do. I lead a team that design pretty much all 17 of the Broadcom DSL CPE chips. 18 Q. Approximately, how large is that team that you lead, 19 Dr. Yu? 20 A. I have eight people reporting to me directly and then 21 30 to 40 people on the entire team. 22 Q. Thank you, Dr. Yu. 23 Is one of the chips that your team designed the 24 BCM63168 chip? 25 A. Yes.

710 1 Q. Is one of the chips that your team designed the BCM 2 6368 chip? 3 A. Correct. 4 Q. Is one of the chips that your team designed the BCM 5 6091 chip? 6 A. No. 7 Q. Who designed that chip? 8 A. It used to be a 2Wire engineer, and Broadcom acquired 9 a portion of 2Wire's engineers many years ago. And sort of 10 acquisition, Broadcom had the ownership of the 6091. 11 Q. When you said many years ago, do you remember the 12 approximate year? 13 A. No, I don't remember. I think at least five years, 14 but I could be wrong. 15 Q. If I said to you that it was 2009, would that be 16 inconsistent with your recollection when -- 17 A. Should be -- should be around that time. I didn't 18 pay attention to how many years. Quite a long time ago. 19 Q. Thank you. And during those approximately ten years 20 that Broadcom has owned the assets of the BCM 6091 chip, has 21 Broadcom maintained the source code for that chip? 22 A. Yes. 23 Q. And in the ordinary course of business, Dr. Yu, over 24 those ten years, have you yourself on occasion looked at the 25 source code for the BCM6091 chip?	712 1 customers will report whatever problem they find in the 2 field, and then we have something we need to resolve. And 3 then we see who reporting to everyone over there. 4 Q. Thank you. 5 A. I don't deal directly with 2Wire. 6 Q. Thank you. Dr. Yu, this is a patent lawsuit. Have 7 you read any of the TQ Delta patents? 8 A. No. 9 Q. Why are you here today, Dr. Yu? 10 A. My boss asked me to be here. 11 Q. I didn't hear you. Your boss? 12 A. My boss. 13 Q. Your boss? 14 A. Yes. 15 Q. And who is your boss? 16 A. Kevin Du. He say you have to go, and then reserve 17 the airline ticket, hotel, everything. Get ready to come. 18 Simple. 19 Q. Is my client, 2Wire, paying you anything to be here, 20 Dr. Yu? 21 A. No. 22 Q. Have you and I met before, to the best of your 23 recollection? 24 A. I believe we met a year ago in a deposition. My 25 memory -- if my memory is correct, but I'm not very good at
711 1 A. Occasionally, yes. 2 Q. And do you work with the former 2Wire engineers who 3 came over to Broadcom when Broadcom acquired the BCM6091 4 chip? 5 A. Yeah. We are in the same team. We are teammates. 6 Q. There's many members of your team; is that right? 7 A. It's a big team. That's why I said the team consists 8 of 30 to 40 people. 9 Q. So Dr. Yu, are you familiar with the source code for 10 all of the Broadcom DSL CPE chips that I've just mentioned 11 by number? 12 A. I understand those chips very well. 13 Q. I'm sorry. I didn't understand that last part. 14 A. I understand those chips very well. 15 Q. Very well? 16 A. Yes. 17 Q. Do you know who 2Wire is, Dr. Yu? 18 A. Excuse me? 19 Q. Do you know who my client, 2Wire is? 20 A. Used to be a Broadcom customer. So I heard 2Wire, 21 but I'm an engineer. I don't do marketing, sales things. 22 Q. You don't interact directly with the customers; is 23 that right? 24 A. I only resolve the problems that the customers 25 report. So that's the reason I heard of 2Wire because the	713 1 recognizing people's face, but I believe we met a year ago, 2 right, during a deposition. 3 Q. You have a very good memory. It was a year ago, and 4 we did meet at that deposition. Nice to see you again. 5 Switching gears slightly, Dr. Yu. 6 A. Okay. 7 Q. When designing Broadcom DSL CPE chips, do you and 8 members of your team reference the DSL standard, the VDSL 9 standard? 10 A. When we -- when we design a chip, we must reference 11 the DSL standard to be able to do DSL commercial product. 12 So, of course, we do. 13 Q. Of course. And I should be more specific, Dr. Yu. 14 When designing the chips that we're talking about here 15 today, did you and your team consult the VDSL2 standard 16 otherwise known as G.993.2? 17 A. You mean the consult interparty or consult spec? 18 Q. Spec. 19 A. Spec, we do. 20 Q. Right. Thank you. 21 Dr. Yu, are you familiar with the O-PMS message 22 that is described -- 23 A. I do. 24 Q. -- in the VDSL2 standard? 25 A. I do.

714 1 Q. Generally, can you please explain your understanding 2 of what the O-PMS message is? 3 A. O stand for the field type. I don't know if you have 4 a meaning with what the field in CPE. Basically it's -- CPE 5 is the equipment in the customer end. 6 Wherever you have a DSL service, you have to 7 have that machine at home that we call CPE. On other side, 8 suppose you subscribe to AT&T service. The equipment on the 9 AT&T side is called CO. That's the terminology. 10 And O stand for CO. It means the message is 11 sent from the CO side. And the PMS means the messaging is 12 related to the parameter about a PMST layer. And the name 13 has many layers depending on the center. 14 And the one there, it calls TMS TC. And that 15 parameter is related to that right there. That in the 16 message is called O-PMS. 17 Q. Does PMS stand for physical media -- 18 A. It's physical media. - 19 Q. -- specification? 20 A. I don't remember. It is a pretty long name because 21 we use O-PMS, PMS, PMD. So I have to recall in my memory 22 what does the PMS mean, but media something. Physical media 23 specific. The code, the TC like a transceiver conversion. 24 I could be wrong. 25 Q. That's okay. Thank you, Dr. Yu.	716 1 MR. PRANGE: Your Honor, same objection. 2 THE WITNESS: Yes. 3 THE COURT: I'm going to overrule that. Go 4 ahead. 5 THE WITNESS: Yes, if you use the aforementioned 6 inside the O-PMS message to calculate the physical memory 7 needed to do the interleaver. 8 BY MR. SCHUMAN: 9 Q. I just want to make sure I heard you correctly. It 10 uses the information in the O-PMS message to calculate the 11 amount of physical memory needed. Is that your testimony? 12 A. Yes. There a dozen of parameters in the O-PMS. And 13 to be -- to be specific, they use two parameters in the 14 O-PMS message. It's called D and I. They those two 15 parameters. 16 Q. The letters D and I? 17 A. Right. 18 Q. And if you know, Dr. Yu, do those D and I parameters 19 come from the latency path field or from some different 20 field of the O-PMS message? 21 A. Different field. It's inside O-PMS message. It has 22 a dozen of parameters. D and I are one of the names or two 23 of them, to be more specific. 24 Q. Thank you. Does the 6091 chip, Dr. Yu, use the O-PMS 25 message to specify the maximum size of the deinterleaver
715 1 I want to ask you a few questions specific to 2 the BCM6091 chip. 3 A. Okay. 4 Q. Then we'll turn a little bit later to the other chip. 5 Okay? 6 A. Sure. 7 Q. Thank you. Does the BCM6091 chip receive the O-PMS 8 message from the central office? 9 A. Yes. 10 Q. Is it the case that all VDSL2 compliant chips must 11 receive the O-PMS message? 12 A. Yes. 13 Q. Does the BCM6091 use the O-PMS message to specify a 14 maximum number of bytes of memory available to be allocated 15 to the interleaver? 16 MR. PRANGE: Your Honor, objection. Side-bar? 17 THE COURT: No. I'm going to sustain the 18 objection. The questions needs to be asked in plain English 19 or to have him explain whatever it is, but not that 20 question. 21 MR. SCHUMAN: Thank you, Your Honor. 22 BY MR. SCHUMAN: 23 Q. I'll try again. I'll rephrase. Dr. Yu, does the 24 BCM6091 chip use the O-PMS message to specify the maximum 25 size of its interleaver memory?	717 1 memory portion of that chip? 2 A. No. 3 Q. Does the source code for the BCM6091 chip use any 4 particular formula or equation for determining how much of 5 its memory to use for the interleaver portion? 6 A. Can you say that again? I don't understand. 7 Q. Sure. 8 A. That question. Very specific. 9 Q. Okay. Let me ask you this way. Does the BCM6091 -- 10 A. Right. 11 Q. -- have a shared memory for the interleaver and the 12 deinterleaver? 13 A. Yes, it does. 14 MR. PRANGE: Your Honor, same objection. 15 THE COURT: All right. Overruled. 16 BY MR. SCHUMAN: 17 Q. Does the source code for the BCM6091 use any 18 particular equation or formula for figuring out what portion 19 of that shared memory should be used for the interleaver? 20 A. Yes, it does. 21 Q. What is that formula? 22 A. The formula is pretty long. It's two times L (times 23 K plus (I minus one) times (D minus one). 24 Q. Thank you, Dr. Yu. 25 You should have a binder. Do you have a small

718 1 binder? 2 A. I don't have anything on the table as I can see. 3 Q. Dr. Yu, are you familiar with the max_delay_octet 4 field in the O-PMS message? 5 A. I do. 6 Q. Does that formula or equation used by the BCM6091 for 7 determining the size of the interleaver memory use any of 8 the max_delay_octet fields from the O-PMS message? 9 A. No. As I mentioned in the formula, it's not part of 10 the equation. 11 Q. Can the formula in the code for determining the size 12 of the interleaver memory result in an amount of interleaver 13 memory that is more than the number of bytes received in the 14 max_delay_octet field of the O-PMS message? 15 A. I would say it's not a fair comparison because the 16 memory -- one is latency. So one is memory, one is latency. 17 So I will answer the question if you change the 18 question a little bit. If you -- the memory allocators can 19 be bigger than the memory derived on the max_delay_latency 20 octet. And then I will say, yes, because the memory, the 21 dedicated memory derived on the max_delay_octet is the 22 max_delay_octet downstream or upstream. I'm sorry. Not 23 downstream, upstream divided by two because this is the -- 24 this is a theoretic number. 25 So I will answer the question if you compare	720 1 deinterleaver memory? 2 A. Okay. I don't know if you call it the formula. The 3 way it does it for the downstream is very simple. That's a 4 predefined memory for the interleaver and deinterleaver. 5 And then you subtract the memory allocated for the 6 interleaver, the rest for the interleaver. It is a formula. 7 Very simple. 8 Q. So without the terminology of the formula -- let me 9 just make sure I have this right. 10 A. Okay. 11 Q. You have the total memory? 12 A. Yeah. 13 Q. And you subtract the amount of the interleaver 14 memory? 15 A. Right. 16 Q. Plus any overhead? 17 A. Right. 18 Q. And that's the way that -- 19 A. Right. 20 Q. -- the BCM6091 determines the size of the 21 deinterleaver memory? Do I have that right? 22 A. Correct. 23 Q. Thank you. Can the size of the deinterleaver memory 24 in the BCM6091 be bigger or greater than the amount of 25 memory that could be derived from the information contained
719 1 memory to memory, and so instead of memory to latency. 2 Q. It's a fair point. Dr. Yu, let me try to reask the 3 question in that way. 4 A. Okay. 5 Q. Is it possible to derive -- 6 A. Right. 7 Q. -- an amount of memory -- 8 A. Right. 9 Q. -- from the information in the max_delay_octet 10 upstream field? 11 A. Right. 12 Q. Yes? 13 A. Yes. 14 Q. Right. And so is it -- is it the case that the 15 amount of memory for the interleaver in the BCM6091 using 16 that long equation -- 17 A. Right. 18 Q. -- can be greater than the amount of memory derived 19 from the information in the max_delay_octet upstream field? 20 A. Absolutely. 21 Q. Thank you. Now, let's talk about the deinterleaver 22 side of the BCM6091 for a few minutes. 23 A. Okay. 24 Q. Does the source code for the BCM6091 chip use any 25 formula or equation for determining the size of the	721 1 in the max_delay_octet downstream field of the O-PMS 2 message? 3 A. Yes. 4 Q. Now, I want to talk just very briefly about the 5 actual allocation of memory in the hardware. 6 A. Okay. 7 Q. After the BCM6091 -- 8 A. Yes. 9 Q. -- figures out or determines the size of the 10 interleaver and the deinterleaver memory -- 11 A. Yes. 12 Q. -- does it physically allocate the memory? 13 A. Yes. 14 MR. PRANGE: Your Honor objection. 15 THE COURT: All right. Overruled. 16 BY MR. SCHUMAN: 17 Q. And can the amount of memory actually allocated for 18 the interleaver be greater than the amount of memory 19 determined using that long formula that you testified to a 20 little earlier? 21 A. No, it's the long formula. It's essentially physical 22 memory allocated for the hardware. So they are not bigger, 23 not smaller. They are exact. 24 Q. Thank you. And would your answer be the same for the 25 deinterleaver side --

722 1 A. Yes. 2 Q. -- of the BCM6091? 3 A. Yes. 4 Q. Thank you. 5 A. So may I make a little bit comment? That question I 6 already answered. For the 6091, it already included 7 overhead. 8 Q. That one, are you referring to the equation? 9 A. Right. The long equation. 10 Q. For the interleaver side? 11 A. Right. 12 Q. Includes the overhead? 13 A. Right. 14 Q. And then for the deinterleaver side, you simply 15 subtract the number you get from that long equation from the 16 total amount of memory? 17 A. Yes. 18 Q. And what's left is the amount determined for and 19 actually allocated to the deinterleaver? 20 A. Exactly. 21 Q. Thank you. Now, let's turn to the other two chips -- 22 A. Okay. 23 Q. -- that we're talking about in this case -- 24 A. Okay. 25 Q. -- the BCM63168 and the BCM6368.	724 1 that the BCM63168 uses to determine the theoretical amount 2 of memory for the interleaver side. Could you please, do 3 you know what that formula is, Dr. Yu? 4 A. I do. 5 Q. Can you please tell the members of the jury what that 6 formula is for the interleaver side? 7 A. Hopefully you can follow me. It's a very 8 sophisticated case, not as simple as the 6091. So there are 9 two cases, case one and case two. The case one you will 10 send so-called max delay upstream, max delay upstream to us, 11 to the CPE. You go into the CPE messaging, we divide by 12 two, so this is the theoretical in minimal memory divided by 13 the maximum, this is theoretical part, but it's not own 14 vector. The second vector it's a D and I, just like a 6091. 15 So I mention also a part of O-PMS message. 16 O-PMS message contain the max delay as well as the D and I. 17 So max delay can have memory which is max delay divided by 2 18 and the D and I memory as (D minus one) times (D minus one) 19 result divide by two. So you find out which one is bigger, 20 and we go for the bigger one. And the way we figure out the 21 theoretical minimal memory requirement is from the O-PMS. 22 And I will reach into the second for the physical memory, 23 you have to take it overhead on top of it. 24 Q. Thank you, Dr. Yu. 25 As part of your answer, you said if we receive
723 1 A. Okay. 2 Q. Do both of those chips use the same Broadcom source 3 code? 4 A. The same source code. They have two different -- two 5 different compilations. The way we work it, we have so many 6 chips, but we try to maintain the single source code. So 7 it's for the maintenance reason. But there are other 8 conditions or compilations for the different hardware 9 because hardware may be different. 10 Q. Does the BCM63168 chip receive the O-PMS message from 11 the central office? 12 A. Correct. 13 Q. And does the BCM63168 chip use the O-PMS message to 14 set the maximum size of its interleaver memory? 15 A. It's a long story. How -- when you say set a maximum 16 interleaver memory, there is a complicated in the 63618 or 17 the 6368 question. If you look at our source code, we have 18 multiple stage to plan out, and there is not the physical 19 memory. Eventually we have to figure how much overhead we 20 need and overhead eventually coming down the physical 21 memory, so I don't know when you say allocated memory, do 22 you mean the original memory or the physical allocated 23 memory? 24 Q. Let's take those in two steps if we can. So when you 25 say theoretical, let's refer to the equation or the formula	725 1 this message, are there some instances when the 2 max_delay_octet upstream portion of the O-PMS message is not 3 received at all by the BCM63168? 4 A. That's correct. There are tons of CO chip in the 5 world made by different companies, made by different ways. 6 The max_delay_octet upstream was added. I don't know which 7 minimum. So when we go to the spec that's been published 8 the minimum chip adding every year, so what it means to the 9 center is changing. So it depend on which year the product 10 has been made. Some of the product made before the feature 11 has been added, and they have no such information. Some 12 product made after that. They decide not to send, not to 13 send. 14 Q. So is this the reason why the formula in the BCM63168 15 has two different ways of determining the size of the 16 interleaver memory because as you just testified, some CO 17 chips may not actually send an O-PMS message with a 18 max_delay_octet upstream field? 19 A. It's better. We have to deal with so many issues in 20 the world. 21 Q. And are there also some instances, Dr. Yu, when the 22 information in the max_delay_octet upstream field is 23 received but is incorrect? 24 A. If we using -- there is a reason we pick out a max. 25 Sometimes we send a standard. They say --

726 1 THE REPORTER: Doctor -- 2 THE COURT: Can you just pick up where you were 3 and try to talk a little bit slower. 4 Q. And I can reorient us. 5 THE COURT: Reorient. 6 Q. I can try. 7 You used the word -- I want to make sure I heard 8 you correctly. Did you say bogus number? 9 A. Yes. Mean the number doesn't make sense. 10 Q. And so let me reask the question again now. 11 Is it the case sometimes that the number 12 received in the O-PMS message, the max_delay_octet upstream 13 field, is bogus? Explain to the members of the jury what 14 you mean by that, please? 15 A. So the CO send in the O-PMS which is a D and I as 16 well as a max_delay_octet. But it's possible that you get 17 the delay based on D and I based on the parameter, (D minus 18 1) (I minus 1) divided by two, actually not divided by two, 19 you divided by not the other side, but recommendation just 20 to get the delay to combine so D minus 1 times I minus 1 is 21 a combined delay. And then you find it's a combined delay, 22 it's bigger than the maximum delay that CO send, that why it 23 means the CO comes by itself. They have bogus. 24 Q. Thank you, Dr. Yu. 25 So that's another reason why you have a second	728 1 memory -- 2 A. Okay. 3 Q. -- for the interleaver -- 4 A. Okay. 5 Q. -- in the BCM63168. 6 A. Okay. 7 Q. Does the chip actually allocate the number that you 8 refer to as the theoretical memory or does it allocate more 9 in the physical memory? 10 A. More, because of how you need overhead on top of 11 theoretical minimum memory. 12 Q. What do you mean by overhead -- strike that. 13 When you say overhead, is that overhead required 14 to actually do the interleaver on the interleaving side of 15 the BCM63168? 16 A. Yes. 17 Q. Why? 18 A. Okay. Put it this way, so I had to explain why this 19 so-called theoretical memory, so people have some idea. The 20 theoretical memory is an independent of what it was designed 21 for. I give you an example. From the transmitter side and 22 send to the receiver side, supposedly there is a delay which 23 is a one second delay. What it means is if you send the 24 first bit come out to the channel until the transceiver 25 receives the first bit, there is a one-second delay
727 1 equation in the BCM63168? 2 A. Yes. It's the same, we cannot have the CO come with 3 it. 4 Q. Thank you, Dr. Yu. 5 Now, this formula or equation that we have been 6 talking about for the last few minutes for the interleaver 7 side of the BCM63168, can that result in a figure or a 8 number for the size of the interleaver memory that is 9 greater than the amount of memory that could be derived from 10 the number in the max_delay_octet upstream field? 11 A. Yes. Beyond what the mention that D and I may go 12 beyond, that's the reason we have to pick out a max of it, 13 if you pick out the other one it's literally bigger than the 14 memory arrive on the max delay, that doesn't need to be 15 there. 16 Q. You referred to these formulas as theoretical memory. 17 I want to turn to the actual allocation of the memory. Let 18 me ask my question, please. In the 63168 on the interleaver 19 side, does the BCM63168 actually allocate in the physical 20 memory the number of bytes of memory determined by that 21 formula or does it allocate some greater or lesser number? 22 A. Can you say it again? So you have to be precise, if 23 it's possible you define which memory you talk about 24 theoretically or physical. 25 Q. I'll try again. When allocating the physical	729 1 supposedly. What it means somewhere in the system had to 2 stall the data enough to hold one second, one second delay. 3 That is needed or it would be lost. So this memory, no 4 matter how you implement the hardware, it must be somewhere 5 to stall lost data because theoretical memory, no matter how 6 you design the hardware in which architecture, it's always 7 the case. 8 But in terms of implementing the hardware, this 9 is a theoretical. It's very hard to reach. It's more 10 difficult to make hardware work. You make the hardware do 11 your work, it's on top of that, so if your hardware have 12 different architecture, different algorithm, so that's the 13 reason you go theoretical minimum. But in real time it's 14 called beyond the minimum, more than that it's called 15 overhead. But without overhead chip won't work. 16 Q. Thank you, Dr. Yu. Just one or two more questions. 17 I want to go over to the deinterleaver side of the BCM63168. 18 A. Okay. 19 Q. In the actual memory, what you have been describing 20 as the physical memory for the deinterleaver side of the 21 BCM63168, is that number greater than the amount of memory 22 that can be derived from the max_delay_octet downstream 23 field from the O-PMS message? 24 A. Yes, because of overhead. 25 Q. The same type of overhead you were just describing a

730 1 moment ago? 2 A. Right. 3 Q. Would the chip work on the deinterleaver side, would 4 it be able to deinterleaver the data without that overhead? 5 A. No. 6 Q. We have been -- I have been asking you a series of 7 questions, Dr. Yu, about the BCM63168. Would your answers 8 be the same for the BCM6368 chip? 9 A. For those parts, they are the same. 10 Q. For those parts? 11 A. Yeah. 12 MR. SCHUMAN: Thank you. Pass the witness, Your 13 Honor. 14 THE COURT: All right. I think we probably 15 should take our -- actually, why don't you go ahead, Mr. -- 16 jury, do you want a break? Okay. Go ahead, Mr. Prange. 17 MR. PRANGE: Thank you, Your Honor. 18 THE COURT: So wait. Actually let me just try 19 again before we do this. If there is -- so if any jurors 20 want a break, if I see one hand, I will give you a break. 21 Okay. Let's take a break. I thought so. Sorry. Fifteen 22 minutes. 23 (Jury leaving the courtroom at 3:10 p.m.) 24 THE COURT: All right. So you all have a 25 message according to our records, you have thirty minutes	732 1 that right? 2 A. They used to be a Broadcom customer. I'm not really 3 sure if we still supply the product to 2Wire or not. I'm 4 not a salesperson. I'm an engineer. 5 Q. Sure. 6 But there is a significant enough relationship 7 for Broadcom to send you to this trial in order to help 8 2Wire; right? 9 A. I only know my boss asked me to be here. Other than 10 that, I have no idea. 11 Q. I think you testified earlier that you haven't read 12 any of the patents that are in this case. Is that correct? 13 A. I haven't read a patent in this case. 14 Q. And that is -- you have some patents; right? 15 A. I do. 16 Q. Do you understand the referencing convention where 17 you just use the last three numbers? 18 A. You know, even I have a patent, I never understand 19 because normally the patent I have it's a lawyer, patent 20 lawyer work with me to come up with patent so I have no idea 21 about what the patent should look like, even I own many 22 patents. 23 Q. Thank you. And do you understand that the patent 24 right is the claims of the patent? 25 A. I have no idea.
731 1 left, plaintiff. Do you understand that? 2 MR. PRANGE: Yes, Your Honor. 3 THE COURT: Okay. Just checking. All right. 4 So we'll be in recess for fifteen minutes. Dr. Yu, you 5 don't have to sit in the stand while we're gone, but don't 6 go far away. We'll be in recess. 7 (A brief recess was taken.) 8 THE COURT: So my law clerk is going to hand out 9 the proposed jury verdict form which you can also look at. 10 Ready to go? 11 MR. PRANGE: Yes, sir. 12 THE COURT: All right. Get the jury. 13 (Jury entering the courtroom at 3:22 p.m.) 14 THE COURT: All right. Members of the jury, 15 welcome back. Everyone, you may be seated. Mr. Prange, you 16 may cross-examine. 17 MR. PRANGE: Thank you, Your Honor. 18 CROSS-EXAMINATION 19 BY MR. PRANGE: 20 Q. Good afternoon, Dr. Yu. How are you doing? 21 A. Very good. 22 Q. We met last year I think today -- 23 A. I believe so. 24 Q. -- at your deposition. 25 You said that 2Wire is Broadcom's customer; is	733 1 Q. And so you don't have any opinions comparing the 2 Broadcom source code to the claims and what they require; 3 right? 4 A. Which claim? 5 Q. The claims that are at issue in this case. 6 A. I never saw that. 7 Q. Okay. 8 A. The patent claim? I never saw the patent. 9 Q. And so you don't have any opinions about whether the 10 Broadcom source code in terms of relation to the claims and 11 what they require here? 12 A. I even don't know which patent -- I don't know what 13 the claim is, so I have no idea about claim part. I only 14 know the source code. 15 MR. PRANGE: Right. Thank you. 16 Nothing further, Your Honor. 17 THE COURT: Any redirect of Dr. Yu? 18 MR. SCHUMAN: No. 19 THE COURT: Dr. Yu, thank you. You may step 20 down. 21 Thank you. Watch your step. Okay. 22 THE WITNESS: Do I need to keep this on here? 23 THE COURT: Just leave it there. 24 THE WITNESS: Okay. 25 MR. SCHUMAN: 2Wire rests, Your Honor.

734 1 THE COURT: All right. Thank you. 2 So we'll make a marker here which we can discuss 3 later as if it happened right now. Okay? 4 MR. MCANDREWS: Thank you, Your Honor. 5 THE COURT: 6 MR. MCANDREWS: Just one quick housekeeping -- 7 actually two housekeeping items. We forgot to move JTX 55 8 into evidence. 9 Can we do that, please? 10 THE COURT: I have no problem with that. Is 11 there an objection? 12 MR. SCHUMAN: Sorry. Just give me a minute. No 13 objection, Your Honor. 14 THE COURT: Okay. Admitted without objection. 15 MR. MCANDREWS: And then just one final thing, I 16 know we're running up on our time limit here, and I want to 17 reserve about four minutes to put Mr. Tzannes on the stand 18 at the end. And so -- 19 THE COURT: Well, we'll give you a high sign 20 when your time is up. All right? 21 MR. MCANDREWS: Excellent. Thank you very much. 22 Plaintiff calls Dr. Todor Cooklev to the stand. 23 BY MR. MCANDREWS: 24 Q. Good afternoon, Dr. Cooklev. 25 A. Good afternoon.	736 1 Q. Can you tell me why that is? 2 A. Yes, I can -- I can illustrate. It is my opinion and 3 conclusion that the certificate of correction was properly 4 issued. And here is the basis for my opinion. 5 Well, let me first illustrate the certificate of 6 correction that was issued. So on this slide on the left, 7 we see claim 5 as originally issued. And so I'm not going 8 to read the claim. There are three words in this claim 9 which were corrected by the certificate of correction. 10 These words are highlighted on this slide. 11 There's the word transmission in the third element of the 12 claim. The word received in the fourth element of the 13 claim, and the word shred that's in the fifth element of the 14 claim. 15 There is no dispute about the word shred, so I'm 16 not going to talk about it. But so let's examine the '381 17 patent, and let's start with claim 1 of the '381 patent. 18 So what you see on the right is claim 1 of the 19 '381 patent. On the left is claim 5 as originally issued. 20 So what happened is the patent attorney handling this patent 21 as an application produced claim 5 on the left using cut and 22 paste. I believe we have all used cut and paste when we 23 prepare documents. 24 And these claims are so similar that only a few 25 words are different. So after performing cut and paste, the
735 1 Q. Welcome back. So you're going to get a chance to 2 comment on two items, certificate of correction and the 3 validity of the patents. 4 Dr. Cooklev, have you prepared a slide 5 presentation to simplify your testimony? 6 A. Yes, I have. 7 Q. And is this it here? 8 A. Yes, this is the first one. 9 MR. MCANDREWS: Permission to publish, Your 10 Honor? 11 THE COURT: Sure. 12 BY MR. MCANDREWS: 13 Q. Dr. Cooklev, you were in the court yesterday and 14 today; correct? 15 A. Yes, I was. 16 Q. Okay. And you heard Dr. Jacobsen's testimony 17 relating to the certificate of correction; is that right? 18 A. Yes, I did. 19 Q. Okay. Did you hear Dr. Jacobsen's testimony that the 20 clerical error corrected by the certificate of correction 21 for claim 5 of the '381 patent would not have been evident 22 to a person of skill in the art? 23 A. Yes, I heard that. 24 Q. And do you agree with Dr. Jacobsen's opinion? 25 A. I disagree with Dr. Jacobsen.	737 1 patent attorney handling the application changed a few 2 words. Well, this is common. We all use cut and paste, I 3 believe. 4 Since the differences are these the two words -- 5 I said I'm not going to talk about shred -- that appear in 6 the third and fourth claim elements. Let me examine them in 7 more detail. 8 So on this slide, we see the third claim 9 element. And again, on the right is claim 1. On the left 10 is claim 5 as originally issued. 11 So we see that using cut and paste, the attorney 12 handling the application produced claim 5 by copying 13 verbatim claim 1, but changing only the following words. So 14 on the right we see the words interleaver to interleave 15 being highlighted. That changed to deinterleaver to 16 deinterleave. 17 That makes sense. Both of these claims, they 18 describe in a different way the transceiver. Also, on the 19 next-to-last line, the word interleaver got changed to 20 deinterleaver. However, well, it's a human nature when we 21 perform cut and paste. The word transmission, the patent 22 attorney forgot to change the word transmission. That word 23 remained in the claim element there. 24 So now, a person of ordinary skill in the art 25 when they examine this claim element, now they will look at

738 1 Figure 1 of the patent. That describes the claim 2 transceiver. And a person of ordinary skill in the art will 3 look at Figure 1. Well, the deinterleaver is described and 4 is shown in the receiver portion, and that's at the bottom. 5 That is at the bottom of Figure 1. That's where the 6 deinterleaver is. 7 And we see that the transmission -- well, the 8 transmission is associated with the transmitter portion, but 9 the deinterleaver we see is associated with reception. It 10 deinterleaves the data that has been received. 11 Well, a person of ordinary skill in the art will 12 see this, and they will see that this is an obvious cut and 13 paste error. So they will recognize that error. They will 14 recognize that it is nonsensical. The original issued claim 15 is nonsensical. It doesn't make sense to deinterleave for 16 transmission. It is just nonsensical because the 17 interleaver is in the receiver portion, but transmission is 18 in the transmission portion. 19 So a person of ordinary skill in the art will 20 recognize that is not only nonsensical, the originally 21 issued claim, but it is also obvious how to fix it. Now, 22 using cut and paste, I think we have all produced the 23 documents, and I think this error happens often. So a 24 person of skill in the art will recognize that the way to 25 fix it is to change transmission with reception.	740 1 the top. So interleaving is performed for transmission. So 2 obviously the originally issued claim element is 3 nonsensical. It just doesn't make sense. 4 But even more than that, it is very close to 5 making sense, and it makes perfect sense when one looks at 6 figure 1 if the word received is changed into -- is changed, 7 transmitted is changed into transmitted. 8 So this is how -- this is the story here for 9 this certificate of correction. And so this is a summary. 10 Now we see the claim, we see the claim as originally issued. 11 We see claim 13 of the '882 patent as originally issued. 12 Again, three -- again, three words needed to be changed. 13 They were typos in the cut and paste. And in a very similar 14 way, a person of skill in the art would recognize that these 15 three words need to be changed according to the certificate 16 of correction. Transmission to reception, receive to 17 transmitted. And shred to shared. 18 Q. Dr. Cooklev, you heard Dr. Jacobsen provide a similar 19 opinion for claim 13 of the '882 patent; is that right? 20 A. Yes, I heard that. 21 Q. Do you agree with her opinion on the certificate of 22 correction for that claim? 23 A. No, I do not agree with Dr. Jacobsen. 24 Q. And why not? 25 A. Well, as this slide shows claim 13 of the '883 patent
739 1 Q. So why wouldn't deinterleaved data ever be 2 transmitted? 3 A. Well, it doesn't make sense to interleave then 4 perform deinterleaving. In other words, to reverse the 5 operation of the interleaver, to undo what the interleaver 6 did, and then to transmit. Right. That doesn't make sense. 7 Then it defeats the whole purpose of 8 interleaving and deinterleaving. So we're back to not 9 having interleaving and interleaving at all. 10 Q. So are you saying it wouldn't make sense to do that? 11 A. It didn't make sense to perform interleaving, 12 deinterleaving, and then to transmit. So this is why a 13 person of skill in the art will recognize how to fix it. 14 They will recognize that they forgot -- this is a typo. 15 They forgot to change transmission into reception. 16 And I will make an analysis for the next -- 17 fourth claim element. Again, we have claim 1 and claim 5 as 18 originally issued. Three words are relevant in this claim 19 element. So we see that the words deinterleaver to 20 deinterleave, they got changed to interleaver to interleave. 21 But the word received, well they forgot to change that when 22 they changed deinterleaver to interleaver. 23 So again, a person of ordinary skill in the art 24 will look at the figure to analyze this claim element, and 25 from the figure they will see, well, the interleaver is at	741 1 is also as originally issued is also the result of an 2 obvious cut and paste error. And it can be changed in 3 exactly the same way. 4 Q. Thank you. 5 I want to move on to invalidity now. So you 6 were here again, you heard Dr. Jacobsen tell the jury that 7 she believes the asserted claims are invalid in view of the 8 LB-031 reference? 9 A. Yes, I was here. 10 Q. Do you agree with that? 11 A. No, I do not. 12 Q. And why not? 13 A. I have slides to illustrate why I disagree with 14 Dr. Jacobsen. 15 The asserted claims are not invalid, they are 16 valid in view of LB-031 and even when combined with the 17 knowledge of a person of skill in the art. 18 Well, LB-031 is a document which even 19 Dr. Jacobsen recognized and acknowledged that it doesn't 20 disclose shared memory. And with respect to this aspect, I 21 agree with Dr. Jacobsen that LB-031 does not disclose the 22 use of shared memory. It is nowhere in that document. 23 Now on the left we see claim 13 of the '882 24 patent, but the word -- the term shared memory features 25 prominently in this claim. It's highlighted with red. And

742 1 we see on the right, LB-031 doesn't have that term, doesn't 2 suggest in any way the use of shared memory. 3 Q. Dr. Cooklev, you heard Dr. Jacobsen say that LB-031 4 might be used with shared memory or might be used with 5 dedicated memory. Do you agree with that? 6 A. No, I do not agree with that. 7 Q. And why not? 8 A. The use of shared memory, there is a substantial 9 difference between shared memory and dedicated memory. And 10 prior to the invention, there was no disclosure of the use 11 of shared memory based on a message received during 12 initialization. It is -- it is -- it is a nontrivial step 13 to use shared memory in a communications transceiver. 14 Q. Can you explain why it is that you believe that 15 LB-031 would not be used with shared memory? 16 A. Yes. Yes, I can. And I have a slide that describes 17 -- I think I can move on. I have a slide that describes the 18 messaging scheme. So LB-031 describes a messaging scheme 19 when the transceiver use dedicated memory. This was the 20 established practice, the established practice at the time 21 of LB-031. So the messaging scheme of LB-031 is as 22 following. 23 So let's assume that the central office 24 transceiver, that's on the left, let's assume that it has 25 30,000 bytes of deinterleaver memory. Again, that's the	744 1 memory that is used to store the Reed Solomon coded data 2 byte must be equal to the amount of interleaver memory 3 that's used to store the Reed Solomon coded data bytes. 4 Q. Dr. Cooklev, so I see on the screen that you have 5 unused portions listed in the VTU-R interleaver, the CPU 6 interleaver, and an unused portion in the CO, VTU-O 7 interleaver, why would those be unused? 8 A. They would be unused because when both of these 9 receives select the smaller of these capabilities, in this 10 case, 10,000 bytes of interleaver memory at the CPE 11 transceiver just will be left unused. There is no way to 12 share that memory, or to -- there is no way to use that 13 memory. 14 Q. Is there any further messaging describing in LB-031 15 that would allow the interleaver of the VTU-R to move that 16 memory down to the deinterleaver? 17 A. No, there is no capability to do that. 18 Q. I would like to move on to the Mazzoni LB-031 19 combination. 20 A. Okay. 21 Q. And you may have heard the testimony, there was some 22 discussion of the Mazzoni problem. If you could describe 23 for me what Mazzoni problem is? 24 A. Yes, I can. And I have a slide prepared for that. 25 So on the left we see claim 13 of the '882
743 1 memory shown with orange. And let's assume that on the 2 other side, the VTU transceiver has 40,000 bytes of 3 interleaver memory. What LB-031 says and that's highlighted 4 with yellow at the top, it says well, if a VDSL2 cell 5 implementation supports a larger interleaver memory than is 6 required, it should be free to specify that value. 7 So both of these transceivers, they are required 8 according to LB-031 to send to the other side their maximum 9 capability. So that's the second sentence. 10 The VTU-O, the central office transceiver and 11 the CPE transceiver would then select the smaller of the 12 transmitter and receiver capabilities in each direction as 13 the end-to-end capabilities. I will describe this just in 14 the upstream direction. The first message up on top the 15 central office receiver will say I have, and I will use 16 that, I have 30,000 bytes of memory in the upstream 17 direction. That's the maximum capability of the central 18 office transceiver. The CPE transceiver will respond with a 19 message I have 40,000 bytes of memory upstream. That's the 20 maximum that it has. 21 Now, according to LB-031, again, we saw the 22 second sentence there, they will select the smaller, each 23 one will select the smaller, the smaller is 30,000. And 24 they will select the smaller because as I testified 25 yesterday and the day before, the amount of deinterleaver	745 1 patent. This is claim 13 as corrected, of course. And here 2 we see that Mazzoni does not describe a messaging scheme. 3 Mazzoni does not describe -- 4 Q. Dr. Cooklev, I'm sorry, we're running short on time 5 here. So does Mazzoni disclose any messaging scheme? 6 A. No, Mazzoni does not disclose messaging scheme and at 7 least for this reason it does not disclose the first and the 8 third element. 9 Q. Could you tell me whether Mazzoni if it uses LB-031 10 would it have enough total memory to satisfy what is 11 necessary for the interleaver and deinterleaver? 12 A. Yes, I can illustrate that. So just perhaps the 13 members of the jury remember that Mazzoni has 12 different 14 services. There's six asymmetric services, six symmetric 15 services. And so this slide describes the most demanding 16 services. These are the A6 service and the S6 service. 17 These services are described in particular. Their memory 18 requirements are described in this table. 19 So we see here in this table that the A6 20 service, it requires deinterleaver memory which is 21 approximately 25,000 bytes. And about 2,000 bytes of 22 interleaver memory making to about 27,000 bytes total. The 23 S6 service requires slightly less than 11,000 bytes in each 24 direction. 25 So in order to support all 12 services, a modem

746 1 needs to have 27,000 bytes of memory. If this is the amount 2 of memory that a device has, it will be able to support all 3 12 services. So this is how much memory is according to 4 Mazzoni. 5 Now, if we combine LB031 with Mazzoni, here is 6 what is going to happen. Now, LB031 requires the devices to 7 exchange their maximum capabilities in each direction, and 8 then to select the smaller of the two. So according to 9 LB031, the central office will communicate to the CPE 10 transceiver that it can support -- this is close to 25,000 11 bytes -- in the downstream direction according to the A6 12 service. 13 The CPE receiver will respond, and it will say 14 it also -- it can support 25,000 bytes in the downstream 15 direction according to the A6 service. Now, in the other 16 direction, the central office will communicate that it can 17 support a little less than 11,000 bytes in the upstream 18 direction according to the service S6. 19 Q. Dr. Cooklev, so how much total memory will be 20 required according to the LB031 messaging scheme? 21 A. So now if we apply this messaging scheme to Mazzoni, 22 so now the total amount of memory that would be required in 23 this case as a result of the LB031 and Mazzoni combination 24 will be close to 36,000 bytes. Well, the problem is the 25 Mazzoni device doesn't have that much. Mazzoni has -- as I	748 1 So you know, I assume you know Mr. Vick? 2 A. I know him by name, and I may have spoken with him in 3 a different -- for a different occasion. 4 Q. This is Jason Vick that we're talking about? 5 A. That's correct. 6 Q. Right. You say you may have spoken with him on a 7 different occasion. What other occasion? 8 A. No, I don't remember. 9 Q. I may have misunderstood your testimony. Can we pull 10 up JTX 001, please? And if you could focus on the 11 right-hand column about midway through. Right. 12 The patent application was prosecuted by Jason 13 Vick; isn't that correct? 14 A. Well, it's one of the names listed here. 15 Q. Okay. Was it Mr. Vick who made the cut and paste 16 error that you talked about? 17 A. Well, again, it's the -- certainly Jason Vick is one 18 of the names that appears here. It might have been someone 19 else at the same firm. I can't represent. 20 Q. Oh, I misunderstood. I thought you spoke with one of 21 these -- 22 A. No. I have not spoken in connection with this 23 matter. 24 Q. So you're just speculating that it was a cut and 25 paste error?
747 1 established, it has slightly less than 27,000 bytes. Since 2 36,000 is greater than 27,000, so the combination of LB031 3 and Mazzoni doesn't work because Mazzoni doesn't have that 4 capability. 5 Q. So that's a inoperable combination? 6 A. Is an inoperable combination. 7 MR. MCANDREWS: Thank you. That's all, 8 Dr. Cooklev. 9 THE COURT: All right. Cross-examination, 10 Mr. Kline? 11 MR. KLINE: Yes, thank you. 12 CROSS-EXAMINATION 13 Q. Good afternoon, Dr. Cooklev. 14 A. Good afternoon. 15 Q. So first focusing on your testimony concerning the 16 certificate of correction, you're not saying that the Patent 17 Office misprinted the claims; correct? 18 A. You mean the originally issued claim? 19 Q. Right. I mean, they printed what the patent 20 applicant gave them; right? 21 A. Yes. The -- 22 Q. Right? 23 A. The cut and paste error was made by the patent 24 attorney. 25 Q. Right. Right.	749 1 A. It's -- this is what it seems to me, yes. 2 Q. Okay. I understand. I misunderstood before. 3 A. It is based on my analysis -- 4 Q. Right. 5 A. -- or it is a cut and paste error. 6 Q. So if we could look at your slide PTX 510 and your 7 Slide Number 5? 8 A. Excuse me. Which number? 9 Q. It's your slide presentation -- 10 A. Okay. 11 Q. -- which I think has been designated PTX 510 and your 12 Slide Number 5. And this is where you were describing the 13 cut and paste process that you're speculating about. Do you 14 have that before you? 15 A. Yes, I believe I do. 16 Q. So as we mentioned, on the left, we can see claim 5 17 from the '381 patent in its original form; correct? No, 18 that is claim 1 on the left, I suppose. 19 A. On the left, I think is claim 5. 20 Q. Here's what I don't understand. If there was a cut 21 and paste exercise, we've got this typo shred. Do you see 22 that? 23 A. Yes. 24 Q. Now, the original claim issued with the word shred 25 when it meant shared; correct?

1 **A. Yes.**
2 **Q.** Right. So I think we can agree that's a typo; right?
3 You think that's a typo?
4 **A. That's a typo, yes.**
5 **Q.** And you talked a lot about this cut and paste that
6 went on. And I think you're saying that the text was cut
7 from here and pasted here, and that was the mistake; is that
8 right?
9 **A. Well, it was a little bit more than it was cut from**
10 **the right part, pasted there and some words got changed,**
11 **which is the claim 5, that particular claim element is**
12 **directed to the deinterleaver. So the words interleaver,**
13 **that got changed to deinterleaver.**
14 **Q.** And that was a mistake?
15 **A. No. This is changing the words interleaver to**
16 **deinterleaver is the intention of this claim element.**
17 **Q.** So I see the transmission got cut from the right and
18 brought over to the left?
19 **A. Yeah, they forgot to change that.**
20 **Q.** Okay. Here is what I don't understand. On the
21 right, the source from which things are being cut, we have
22 got the word "shared"; correct? Do you see that?
23 **A. Yes. Yes, I do.**
24 **Q.** Somehow over here on the left that becomes shred. So
25 that obviously wasn't a simple cut and paste, was it?

1 **A. Well, I think in real life, typos do happen**
2 **unfortunately.**
3 **Q.** They'll get carried over in a cut and paste, though,
4 won't they?
5 **A. Well, they would. It's not a hundred percent**
6 **sometimes cut and paste. Sometimes they edited certain**
7 **words and they have a there that might have been deleted,**
8 **and actually it was deleted.**
9 **Q.** When you say it was deleted, what was deleted?
10 **A. I think the letter A.**
11 **Q.** You think somehow in a cut and paste exercise, bytes
12 within the shared memory allocated to became bytes within
13 the shred memory allocated to, somehow the letter A is the
14 only letter in that string that got dropped in the cut and
15 paste exercise that you speculate happened here, is that
16 your testimony?
17 **A. Well, as I said, I think it is -- it's human nature**
18 **to -- so it is 99.9 percent cut and paste, but sometimes**
19 **certain letters can I think -- they can be typos.**
20 **Q.** Now, this -- you can drop that. This mistake as you
21 characterize it got made kind of a lot, wouldn't you agree?
22 **A. What do you mean by a lot?**
23 **Q.** Well, if we could look at Joint Trial Exhibit 1, page
24 11, this is claim 5 of the '381 patent as it originally
25 issued. And in the allocating step, we can see that this

1 word here, transmission, that's one of the mistakes; right?
2 **A. Yes, I believe that's correct.**
3 **Q.** Right.
4 And then later in the claim we can see this
5 word, there is a word received, and that's a mistake; right?
6 **A. Yes, that's the second.**
7 **Q.** And then if we pull off claim 13, if you can go to
8 the '882 patent which is Joint Trial Exhibit 2, claim 5 in
9 the means for allocating step. Again, we have got the word
10 transmission here; right?
11 **A. Yes.**
12 **Q.** And you're saying that's wrong; right?
13 **A. Yes.**
14 **Q.** And then if we drop down to the means for allocating
15 step later, we have got the word received. And that's
16 wrong; correct?
17 **A. It is wrong, interleaver doesn't interleave for**
18 **transmission.**
19 **Q.** So now we have seen four mistakes in two claims,
20 right, we have seen four mistakes in two claims according to
21 you?
22 **A. Well, in two different patents.**
23 **Q.** Two claims, right?
24 **A. In two different patents.**
25 **Q.** Right. But if we look at another claim in the '882

1 patent, claim 13, in the allocating step, we have got this
2 word transmission here, deinterleaver for transmission, so
3 you're going to tell me that's a mistake; right?
4 **A. Yes.**
5 **Q.** Later in the allocating step, we're interleaving with
6 received, and you're going to tell me that's a mistake;
7 correct?
8 **A. Yes.**
9 **Q.** We have got three claims with six mistakes; right?
10 **A. Well, I think the fact that we have three claims in**
11 **three different patents and that it is the same mistake or**
12 **similar or exactly the same shows it is a cut and paste**
13 **error.**
14 **Q.** So we have got six mistakes in three claims so far;
15 right?
16 **A. So far, yes.**
17 **Q.** And I would like to look at the '048 patent, please,
18 JTX-3 at line 12. Page 12, I'm sorry. We have got the
19 second allocating step. And again, we're interleaving data
20 that's received, right, in the originally issued claim?
21 **A. Yes.**
22 **Q.** So you're going to tell me that's a mistake; right?
23 **A. Yes.**
24 **Q.** So now I have got five mistakes in four claims
25 according to you. Then there is another patent not in this

1 lawsuit, but if we could go to Joint Trial Exhibit 90, at
 2 page 11, claim 5 -- I'm sorry, I'm sorry, I misspoke,
 3 Defendant's Trial Exhibit 90, thank you, at page 11, claim
 4 5, the second allocating step again, we have got it up here,
 5 we're interleaving received data, do you see that?
 6 **A. Yes, I do.**
 7 **Q.** Again, you're going to tell me that was done by
 8 mistake?
 9 **A. All of these patents share the same specification.**
 10 **Q.** The claims are all different?
 11 **A. The claims are different.**
 12 **Q.** We have only looked at these mistakes in the claims;
 13 correct?
 14 **A. Correct.**
 15 **Q.** That's four different patents we looked at; right?
 16 **A. With the same specification.**
 17 **Q.** I understand that. But we have looked at four
 18 patents, all the claims are different, and four times we've
 19 seen in four different patents we have seen transmit, you're
 20 telling me that should be received. We have seen received,
 21 you're telling me that should be transmit. We have got this
 22 pattern across four patents?
 23 **A. That's correct.**
 24 **Q.** That you are aware or that the patent owner is filing
 25 and prosecuting to issuance, the Patent Office is issuing

1 these patents in the form filed by the patent applicant and
 2 now you're saying well, it was all a big mistake, that's
 3 your testimony?
 4 **A. I think the fact that it is happening all these times**
 5 **and the facts that all these patents share the same**
 6 **specification, that is a cut and paste I think almost**
 7 **certainly, all of them share the same figure 1. And**
 8 **although the claims, the claims are different, but they are**
 9 **very similar as I think we have analyzed. And I also think**
 10 **that the claims are, they are very technical, they use**
 11 **patent language as claims, so yes, yes, the Patent Office**
 12 **has looked at them and initially issued them until later the**
 13 **applicant realized that there is a typo.**
 14 **Q.** You say it's a typo. Shred for shared, that's a
 15 typo. Fair enough?
 16 **A. Okay.**
 17 **Q.** Transmitter for receptor, that's a change of the
 18 word. Somebody didn't intend to type transmission and
 19 instead mistype receiver; correct?
 20 **A. They use cut and paste and forgot to change it. I**
 21 **agree it's a typo.**
 22 **Q.** You don't know, you never spoke with the patent
 23 attorney; correct?
 24 **A. That's correct.**
 25 **Q.** You don't know how the claims were pulled together;

1 correct?
 2 **A. Well, when we have documents with the same**
 3 **specification and very similar claims, I think it's very**
 4 **reasonable that cut and paste was used.**
 5 **Q.** But you don't know that; correct?
 6 **A. Well, I think I answered that.**
 7 **Q.** You answered that you never spoke with any of the
 8 attorneys; correct?
 9 **A. Well, I have not performed that kind of analysis,**
 10 **yes.**
 11 **Q.** So if we could take a look, just last question on
 12 this subject, JTX Exhibit 1. That's the '381 patent that's
 13 at issue here; correct. Do you see that, Dr. Cooklev?
 14 **A. I do.**
 15 **Q.** And let's go to page eight -- no, I'm sorry, yeah,
 16 page eight. Column six. Around lines 55. Okay. That
 17 doesn't feel right. How about if we look at the other side.
 18 **A. Excuse me, which column?**
 19 **Q.** If we could see this whole paragraph, maybe.
 20 So looking around line 40 of the '381 patent,
 21 column 5, do you have that?
 22 **A. Column 5.**
 23 **Q.** Right. Do you have that before you?
 24 **A. Yes, I do.**
 25 **Q.** The patent describes beginning at around line -- it's

1 around line 47, it says alternatively, for example, an
 2 exemplary transceiver complies a shared
 3 interleaver/deinterleaver memory and be designed to allocate
 4 a first portion of shared memory to a first deinterleaver.
 5 Do you see that?
 6 **A. I do.**
 7 **Q.** Do you see at the end of this paragraph, the patent
 8 applicant described, "Regardless of the configuration, in
 9 general, any interleaver or deinterleaver, or grouping
 10 thereof, be it in a transmitter portion or receiver portion
 11 of the transceiver, can be associated with a portion of the
 12 shared memory."
 13 Did I read that correctly?
 14 **A. I think you did.**
 15 **Q.** Thank you.
 16 So I would like to ask you some questions about
 17 the prior art that you talked about. Now, you do agree that
 18 in the LB-031 reference, there is in fact a messaging scheme
 19 disclosed; correct?
 20 **A. There is a messaging scheme in LB-031.**
 21 **Q.** And you also agree that in the LB-031 reference, that
 22 it at least discloses exchanging maximum number of bytes
 23 available in each direction; correct?
 24 **A. Yes, what is being exchanged is fine.**
 25 **Q.** Thank you.

758 1 A. Yes. 2 Q. And you agree that LB-031 discloses a process of 3 determining an amount of memory that's required by an 4 interleaver to deinterleave a first plurality of Reed 5 Solomon coded data bytes; correct? 6 A. I'm not sure I have offered that opinion. 7 Q. Based on your knowledge and expertise, having read 8 the LB-031 reference, you agree that LB-031 discloses a 9 process for determining an amount of memory that's required 10 by an interleaver to interleave a plurality of Reed Solomon 11 coded data bytes; isn't that correct? 12 A. I think LB-031 will have something like that. 13 Q. Well, in fact, you agree that it discloses that; 14 correct? 15 A. By selecting the minimum of the capabilities of both 16 sides. 17 Q. All right. I'm going to ask it again. You would 18 agree that LB031 discloses a process for determining an 19 amount of memory that's required by an interleaver to 20 interleave a plurality of Reed-Solomon coded data bytes; 21 correct? 22 A. You know, I would -- I don't want to speculate right 23 now. 24 Q. Okay. So then again, you were deposed in this matter 25 on January 28th of this year?	760 1 required to deinterleave a plurality of Reed-Solomon coded 2 data bytes; correct? 3 A. Yes. 4 Q. And you agree that the Mazzoni reference we have 5 looked at discloses shared memory as the term has been 6 construed by the Court for this case; correct? 7 A. I think, yes. 8 Q. And you agree that Mazzoni discloses shared memory 9 that can be allocated between an interleaving function and a 10 deinterleaving function; isn't that correct? 11 A. Yes. 12 Q. And Mazzoni discloses three parameters that it calls 13 IM, IPrime, and MPrime; correct? 14 A. Well, now that we are getting into Mazzoni, from 15 memory, I recall that's correct. 16 Q. Right. 17 A. But -- 18 Q. And thank you. And in Mazzoni, those three 19 parameters are linked to predefined service profiles; 20 correct? 21 A. I think that's correct. 22 Q. And you agree that those predefined service profiles 23 are dependent on upstream and downstream bit rates; right? 24 A. Well, the profiles defined downstream and upstream 25 bit rates.
759 1 A. Yes, I was. 2 Q. Right. And if you would look at Tab 8 in your 3 binder. Do you have that? 4 A. Yes. 5 Q. And if you could turn to Page 140. Do you have that 6 before you? 7 A. Yes. 8 Q. You see the top of the page, there's an answer. You 9 said, "Excuse me. LB031 discloses what?" 10 Do you see that? 11 A. Yes, I do. 12 Q. And the question came: "A process for determining an 13 amount of memory that's required by an interleaver to 14 interleave a plurality of Reed-Solomon coded data bytes." 15 Did I read correctly the question you were asked at your 16 deposition? 17 A. Yes. 18 Q. And you answered, "I think I would agree with that 19 general statement." Did I read that correctly? 20 A. Yes. 21 Q. Thank you. Now, you also agree that LB031 discloses 22 a process for determining the amount of memory that's 23 required by a deinterleaving -- I'm going to start again. 24 You would also agree that LB031 also discloses a 25 process for determining the amount of memory that is	761 1 Q. Right. 2 MR. KLINE: I have no further questions, Your 3 Honor. 4 THE COURT: All right. I guess there's no 5 redirect? 6 MR. MCANDREWS: No redirect. 7 THE COURT: All right. Dr. Cooklev, you can 8 step down and watch your step. Thank you. 9 Can I see counsel over at side-bar for a minute? 10 (Beginning of conference held at side-bar.) 11 THE COURT: So according to my expert source, 12 you have used up all your time. Is there anything else you 13 wanted to do? 14 MR. MCANDREWS: So Your Honor, I think if you 15 remember, earlier you said there was some deposition 16 designations that we needed to work out. 17 THE COURT: Yes. 18 MR. MCANDREWS: I agree that I thought I used 19 all my time, but my tech guy is telling me that we actually 20 have a minute and 56 seconds based on the designations. 21 MR. WIMBISCUS: And we won't even need that 22 much. 23 THE COURT: Well, I'm going to take you at your 24 word there because I think I can do that. And so 25 Mr. Schuman, I'm inclined to give him the two minutes which

762 1 I think is probably one minute more than what he needs for 2 what he needs to do. 3 Do you have any comment? 4 MR. SCHUMAN: I just reserve my objection for 5 the record, Your Honor. I think -- 6 THE COURT: Okay. Well, you know, I was trying 7 to get the -- I mean, when you did the deposition 8 designations, you got charged a hundred percent; is that 9 right? 10 MR. MCANDREWS: Yes. 11 MR. FARNAN: Yes. 12 MR. MCANDREWS: For the counters, it was 13 supposed to count against them. 14 THE COURT: Well, yeah, that's how it works. 15 The counter is used against them. 16 MR. FARNAN: Your Honor, we were charged a 17 hundred percent. 18 THE COURT: So do you actually know this, 19 Mr. Farnan? Has somebody figured out that the counters is 20 one minute and 56 seconds? 21 MR. FARNAN: Yes, Your Honor. 22 MR. SCHUMAN: And I'm not going to dispute their 23 math. I'll take them at their word. My objection was to 24 them getting to do a rebuttal case. That was a disputed 25 matter.	764 1 A. Yes, I was. 2 Q. Did you understand her to suggest that there were 3 suggestions at ITU meetings where shared memory was 4 discussed prior to the date of your inventions? 5 A. That's what she said, yes. 6 Q. Is what she suggested true and accurate? 7 A. It is not. 8 Q. Can you tell the jury what is true and accurate? 9 A. In October 2004, Michael Lund and I came up with the 10 idea, invented and patented the shared memory that everybody 11 has been discussing here this week. And then after that, 12 which is common, I went to the ITU and told other ITU 13 members about this idea, including Andy Deczky who 14 Dr. Jacobsen mentioned who is a friend of mine as well. And 15 the other person who she couldn't remember was Bernd Heise 16 from Infineon. 17 So, yes, there were discussions at the ITU about 18 this, but all these discussions happened after -- after I 19 filed the patent, and we had told other people about it. 20 MR. WIMBISCUS: No further questions. We pass 21 the witness, Your Honor. 22 THE COURT: All right. Cross-examination. 23 CROSS-EXAMINATION 24 BY MS. WALSH: 25 Q. Good afternoon, Mr. Tzannes.
763 1 THE COURT: I think the rebuttal case is going 2 to be limited to Mr. Tzannes saying, I was at the meetings. 3 I didn't talk about shared memory with anyone; right? 4 MR. SCHUMAN: Your Honor, just to be clear, if 5 they do that, we get a right to cross-examine. We still 6 have time left; right? 7 THE COURT: Yeah. You've got time. You can 8 take us into tomorrow, but I hope you won't. 9 MR. SCHUMAN: No, but we would like to 10 cross-examine. 11 MR. WIMBISCUS: We will address the meeting, 12 Your Honor. I don't know exactly -- 13 THE COURT: Well, whatever. So you've got a 14 minute and 56 seconds. Use it wisely. 15 MR. WIMBISCUS: Thank you, Your Honor. 16 (Conference at side-bar was concluded.) 17 MR. WIMBISCUS: Your Honor, TQ Delta calls 18 Marcos Tzannes. 19 THE COURT: Mr. Tzannes, you're still sworn from 20 when you testified the first time. 21 THE WITNESS: Thank you. 22 DIRECT EXAMINATION 23 BY MR. WIMBISCUS: 24 Q. And Mr. Tzannes, we have very little time. You were 25 here for the examination of Dr. Jacobsen?	765 1 A. Hello. 2 Q. It's not the case that you were privy to every 3 discussion that took place at the ITU meetings; is that 4 correct? 5 A. Well, I wasn't everywhere all the time, no. 6 Q. And I think you were here when your counsel suggested 7 that it was silly that people at four or five-day meetings 8 would discuss, you know, and talk shop over coffee or things 9 like that on coffee breaks; correct? 10 Do you agree with that statement? 11 A. I don't remember that. Sorry, I don't understand 12 what you're saying. 13 Q. Your counsel suggested that it would be silly for 14 people at a meeting that lasts four or five days to have 15 discussions over coffee breaks. Do you recall that 16 testimony? 17 A. Who said that? 18 Q. Your counsel. 19 A. Okay. Well, you know, Pete made a mistake. We did 20 discuss -- obviously, we discussed those things at coffee 21 breaks. He hasn't been to an ITU meeting. 22 Q. Sure. And you also attended meetings for an 23 organization called ETSI or E-T-S-I; is that correct? 24 A. No, I did not. 25 Q. But you did attend the meeting in Leuven, Belgium in

766 1 June of 2004; correct? 2 A. Of ITU? 3 Q. Of the ITU. 4 A. Yes. 5 Q. And it's your testimony that shared memory wasn't 6 discussed until after October of 2004 at the ITU; is that 7 correct? 8 A. Yes. 9 MS. WALSH: Your Honor, may I approach the 10 witness? 11 THE COURT: Sure. 12 BY MS. WALSH: 13 Q. And so Mr. Tzannes, I've handed you a document that's 14 a temporary document from the ITU; correct? 15 A. Mm-hmm. 16 Q. And that document is from the Leuven meeting in June 17 of 2004? 18 A. Yes. 19 Q. And if you could please flip to the second page -- 20 A. Mm-hmm. 21 Q. -- at the section marked 11.8? 22 A. Yes. 23 Q. The column on the left reads, "Dual latency is 24 mandatory." 25 Do you see that?	768 1 MR. WIMBISCUS: No further questions. 2 THE WITNESS: Can I elaborate? 3 THE COURT: I think he's ready to be done, so 4 no. So Mr. Tzannes, now you can step down. 5 All right. So plaintiff, do you rest? 6 MR. MCANDREWS: Yes, Your Honor. We rest. 7 THE COURT: All right. So we're done. 8 MR. SCHUMAN: I think we're done with the 9 presentation of evidence. 10 THE COURT: All right. So members of the jury, 11 sometimes you're lucky and things go a little faster than 12 you expect. So we're finished with testimony for today. 13 I'm going to have to meet with the attorneys and try to 14 straighten out jury instructions and things like that. 15 I'd like you to be back here tomorrow morning 16 ready to go at 9:00 o'clock. I expect we'll be ready to 17 have some jury instructions from me and closing arguments by 18 counsel, and I have to talk to counsel about how long these 19 closing arguments are going to be. 20 But at some point before lunch tomorrow, you 21 ought to be getting the case for deliberations. In the mean 22 time, just like you did today, showing up on time, don't 23 discuss the case with each other. Don't discuss the case 24 with anyone else. You can't discuss the case with anyone 25 until you're in deliberations which hopefully will be
767 1 A. Yes. 2 Q. And that's referring to the latency paths that were 3 being discussed in VDSL2; correct? 4 A. Yes. 5 Q. And then there's a note there that says interleaver 6 memory could be shared between the two paths, and the 7 aggregate delay of the two paths need not exceed 20 8 milliseconds. 9 Do you see that? 10 A. Yes. 11 MS. WALSH: Thank you, Mr. Tzannes. 12 THE COURT: All right. Mr. Tzannes, thank you. 13 You may step down. Watch your step. 14 Do you have any more time? 15 MR. WIMBISCUS: I have one question. 16 THE COURT: All right. Sorry, Mr. Tzannes. 17 Come on back. 18 REDIRECT EXAMINATION 19 BY MR. WIMBISCUS: 20 Q. Mr. Tzannes, with respect to the portion of the 21 document that counsel just referred to -- 22 A. Mm-hmm. 23 Q. -- 11.8, are the fast and slow paths. They're in the 24 same direction; is that right? 25 A. That's right.	769 1 sometime before too much time is up tomorrow. 2 And don't do any research. Part of what closing 3 argument is for the attorneys is a chance to try to -- for 4 them to tie together the various things you've heard and 5 help make sense out of it. So keep an open mind. Don't do 6 any research. You know, do whatever you need to do to be 7 wide awake when you get here because it's going to be a long 8 morning, unfortunately. But we'll take some breaks to try 9 to give everyone a chance to recover from -- and the most 10 boring person of all will be me when I give you jury 11 instructions. Sorry about that. So in any event, in the 12 mean time, have a good evening. 13 Can we take the jury out, please? 14 (Jury leaving the courtroom at 4:29 p.m.) 15 THE COURT: All right. Everyone be seated. Do 16 you want to -- first off, Mr. McAndrews, you had -- I gave 17 you a marker like a half hour ago or 45 minutes ago or 18 whatever it was, if somebody wants to fill in whatever they 19 want to fill in on that marker. 20 MR. MCANDREWS: Yes. Mr. Murphy is going to be 21 presenting the motion. 22 MR. MURPHY: Good afternoon, Your Honor. Jim 23 Murphy on behalf of TQ Delta again. I would like to move 24 under Rule 50(a) for judgment as a matter of law, Your 25 Honor. We respectfully moved with respect to Rule 50(a) for

770 1 finding of infringement on the asserted claims for the 2 accused -- against the accused products, and for a JMOL, 3 judgement as a matter of law for validity of all asserted 4 claims, Judge. 5 We also move for a judgment as a matter of law 6 that the certificates of correction have not been shown to 7 be invalid. Your Honor, that's under clear and convincing 8 evidence standard. 9 As you know, it's 2Wire's burden to prove by 10 clear and convincing evidence that the clerical error 11 corrected by the Patent Office was not clearly evident to a 12 person of ordinary skill in the art. 2Wire has failed to 13 identify any such sufficient evidence to make such a showing 14 to any reasonable juror. TQ Delta has presented ample 15 evidence that the errors corrected by the certificate of 16 correction would have been clearly evident to a person of 17 ordinary skill in the art. 18 The defendant 2Wire has failed to show this at 19 all much less by clear and convincing evidence and no 20 reasonable juror could conclude that the errors corrected by 21 the certificates of correction were not evident to a person 22 of ordinary skill in the art or that the certificates of 23 correction were issued invalidly. 24 Next, Judge, no reasonable juror could find that 25 by making, using, selling, offering for sale or importing	772 1 reasonable juror could find that 2Wire does not infringe the 2 asserted claims of the asserted patents. 3 So we move for infringement, a judgment as a 4 matter of law of infringement of each asserted claim of each 5 asserted patent. 6 TQ Delta also moves for judgment as a matter of 7 law of no invalidity of the asserted patent. Every asserted 8 patent claim is presumed valid. The presumption of validity 9 exist at every stage of the litigation. And the invalidity 10 must be proven by clear and convincing evidence. 11 2Wire's invalidity defense with respect to each 12 claim was limited to obviousness, and two prior art 13 references or a combination. 2Wire contends that two 14 references render claim 1 of the '048 patent, claim 5 of the 15 '381 patent, claim 13 of the '882 patent obvious, the LB-031 16 reference and Mazzoni U.S. Patent 7,269,208. No reasonable 17 juror could find that those references in combination teach 18 the claimed inventions and certainly not by clear and 19 convincing evidence. 20 In fact, 2Wire acknowledges that the LB-031 21 document does not expressly teach the shared memory as 22 recited in the patent claims. 23 Moreover, the unsalable evidence has shown that 24 Mazzoni, this what is called the Mazzoni problem which makes 25 its combination with teaching of LB-031 incompatible.
771 1 accused 2Wire product model numbers 5031NV, the 5168NV, the 2 5168N, the 5268AC, i3812D, 3801HGV, 2Wire does not literally 3 infringe claim 1 of the '048 patent, claim 5 of the '381 4 patent and claim 13 of the '882 patent. 5 TQ Delta has put forth ample and legally 6 sufficient evidence of 2Wire's infringement that no 7 reasonable juror could dispute. It came in three forms, 8 Your Honor, evidence first that 2Wire's accused products 9 comply with all the relevant components of the VDSL2 10 standard. A second form of the proof was testing performed 11 by Dr. Cooklev that showed that the accused products include 12 all of the claim elements of all asserted claims. And a 13 that all are capable of operating in conformance with each 14 asserted claim. 15 The third portion of the proof, it independently 16 showed the software analysis showing that each product 17 operates in conformance, includes all the claim elements and 18 is capable of operating in conformance with each asserted 19 claim. All of this testimony was essentially un rebutted by 20 2Wire. In fact, 2Wire's principal expert did not even 21 investigate the accused products or offer such ultimate 22 opinion. 23 For that reason, Judge, no reasonable juror 24 could find that the accused products do not include every 25 element of each claim of the asserted patents, and no	773 1 2Wire's principal technical expert testified today in no 2 uncertain terms Mazzoni does not include the required 3 messaging. She testified that rather it was frozen at 4 installation. And combining the LB-031 document with 5 Mazzoni was contrary to the goal of the shared memory of the 6 patents-in-suit and, therefore, it is not properly 7 combinable. 8 Therefore, Judge, 2Wire has not introduced 9 sufficient evidence for any reasonable juror to conclude 10 that there is clear and convincing evidence of invalidity of 11 any certain claim and TQ Delta also moves for judgment as a 12 matter of law of validity of all asserted patent claims. 13 THE COURT: Thank you, Mr. Murphy. 14 So on infringement, I'm going to deny it. I 15 think there is disputed material facts about what a message, 16 the O-PMS message, whether that claim element is met. 17 So I'm going to deny that. Hold on one minute. 18 (Side-bar discussion without counsel or reporter 19 present.) 20 THE COURT: All right. Well, I thought about it 21 some, so I'm going to deny the motions on all grounds 22 raised. I think whether or not the certificate of 23 correction meets the standard is disputed material facts. I 24 think that LB-031 has everything but the shared memory. I 25 don't think there is really any dispute. And given there

774 1 are only two kinds of memory out there, it seems to me that 2 the jury could find invalidity. I think Mazzone discloses 3 shared memory and so I think -- so I'm not impressed by that 4 combination, LB-031. I'm going to deny all the JMOLs. 5 Is there anything else anybody else wants to 6 talk about before we start thinking about jury instructions 7 and the verdict form? 8 MR. PRANGE: Your Honor, briefly, I think there 9 is a matter of housekeeping about the admission of the 10 exhibits that were submitted or offered to submit in 11 relation to the source code. 12 THE COURT: So you were going to think about 13 that, Mr. Prange. 14 MR. PRANGE: I have thought about that and I 15 think it's absolutely appropriate that they be entered so 16 the jury can consider them in addition to all the other 17 evidence. 18 THE COURT: How many pages is all that stuff? 19 MR. PRANGE: Considering it's only the specific 20 pages, I think it's going to be -- I don't have a count, my 21 expectation it's probably under thirty. 22 THE COURT: Okay. 23 MR. PRANGE: But I have got to do a count to 24 figure out what the exact pages are. 25 THE COURT: All right. Do 2Wire, do you have	776 1 THE COURT: Okay. Hand it up. 2 MR. MURPHY: That would be -- there is two on 3 there, Judge. That's the first instruction. 4 THE COURT: Right. 5 MR. MURPHY: And two sentences, Judge, it's bare 6 and basic just to make sure that the jurors are not 7 influenced by that testimony. 8 THE COURT: All right. So hold on, Mr. Murphy 9 and Mr. Ong. 10 Mr. Ong, so the first one about the discussion 11 between witnesses, you know, I guess, first, do you object 12 to that? And second, if you do, why? 13 MR. ONG: Your Honor, I don't think that -- we 14 don't think that this instruction is necessary. 15 THE COURT: Well, so, is it harmful in some way? 16 MR. ONG: This is the first time that we have 17 got this. 18 THE COURT: But things happen in trial. 19 MR. ONG: I understand. 20 THE COURT: But that's fair to need some time. 21 Here is what I'm thinking, which is there were these 22 questions, there was certainly not a suggestion that there 23 was something -- that experts weren't very diligent because 24 they didn't talk to other experts, then there was -- let me 25 think about this more. Then there was well, we were barred
775 1 any opinion on this? 2 MR. SCHUMAN: I do not think so, Your Honor. 3 THE COURT: All right. I'm going to do this, 4 I'm going to temporarily admit them. In other words, you 5 can put whatever appropriate exhibit stickers on and we'll 6 send them back to the jury. My prediction is there will be 7 no evidence that they will ever actually look at them. But 8 when we're done, I expect that I am going to think better of 9 having them in the record, and probably give them back to 10 wherever they got them from. But they'll go with the jury. 11 Okay. 12 MR. PRANGE: Thank you, Your Honor. 13 THE COURT: Anything else? 14 MR. MURPHY: Yes, one quick issue, Judge, maybe 15 not so quick, but based on the recent testimony we have two 16 additional proposed curative additional jury instructions. 17 THE COURT: Go ahead. 18 MR. MURPHY: The first, Judge, is a curative 19 instruction regarding discussions between witnesses. There 20 was testimony elicited by 2Wire that the experts, our 21 experts on our side were not allowed to talk to one another. 22 And with the implication that it was somehow improper that 23 they didn't talk to one another. We would ask for a very 24 simple instruction. I could pass it up to you what we have 25 written.	777 1 by court order from talking to each other. I don't know at 2 some point during the trial, there was talk about 3 sequestration, not that I think anyone on the jury probably 4 knows what's meant by that word, because who would unless 5 you were a lawyer. 6 MR. MURPHY: Judge, if you recall the TQ Delta 7 experts were asked during cross-examination that they didn't 8 talk to another, why they didn't talk to another. There was 9 a strong implication that there was something untoward about 10 them not talking to one another. 11 THE COURT: Actually when you say were they 12 asked why did you not talk to each other or was it did you 13 talk to each other and the answer was no. 14 MR. MURPHY: It was the later, did you talk to 15 each other with the implication that they should have. 16 THE COURT: What do you have to say about this 17 because it does seem like the cross under the circumstances 18 was perhaps not a hundred percent fair. 19 MR. SCHUMAN: Your Honor, I'm not a hundred 20 percent sure, I want to be careful in my representation to 21 the Court that this topic came out for the first time on 22 cross. I'm not sure that it wasn't said in response to a 23 question on direct. However, the same question applies 24 equally to the cross-examination of our expert, Dr. Walker, 25 when TQ Delta counsel was cross-examining this morning about

778 1 why he didn't spend more time in Minneapolis. 2 THE COURT: That's the reason why I cut that off 3 as soon as it came up because I could tell that was a poor 4 -- I recognized that before it got to be in my opinion too 5 far. 6 MR. SCHUMAN: I certainly respect the Court's 7 judgment on that, but I think the jury certainly heard 8 questions not only about why he didn't go to Minneapolis, 9 but there was a whole series of questions suggesting that 10 the code that Dr. Walker reviewed in Palo Alto was not the 11 same copy that was available to TQ Delta experts in 12 Minneapolis. So I think that issue is at least as bad if 13 not worse because Dr. Walker was cross-examined extensively 14 on something of a similar nature. 15 MR. MURPHY: I think you saw the harm in the 16 Minneapolis questioning and you cut that off. I haven't 17 heard anything from Mr. Schuman how this very neutral jury 18 instruction could be harmful in any way. It's very neutral. 19 It operates for both sides and is very innocuous. It does 20 correct some implications that were improper when there was 21 a court order barring them from speaking to one another. 22 THE COURT: Well, you know, I'm not a hundred 23 percent sure who was asking the questions when that came 24 out. 25 MR. SCHUMAN: I think it might be important, you	780 1 perfectly reasonable request. It's also something where 2 Dr. Almeroth, yeah, maybe it makes a lit bit of difference 3 how it came up, even though -- so why don't you all reserve 4 that, and we'll be able to get back to that. Okay? 5 So then the second proposed instruction has to 6 do with this coffee break business. And you know, I don't 7 think the proposed instruction is right. In the end, the 8 rebuttal testimony of Mr. Tzannes sort of suggested these 9 are the kinds of -- I mean, sort of agreed with Dr. Jacobsen 10 that such conversations take place. Someplace we say what 11 the prior art is in the jury instructions. And then saying 12 these aren't relevant to anything, I think that actually 13 goes too far. 14 So I'm not inclined to give instruction number 15 two, and I'm inclined to let you think about or discuss 16 amongst yourselves instruction number one. 17 MR. MURPHY: Could we also do that with number 18 two? This just came out, the coffee break business. The 19 jury instructions were fixed before today's testimony. 20 THE COURT: Well, they're not fixed, or I mean, 21 I guess we were working on them, but you'll see we have some 22 stuff in there. In fact, I'm pretty sure now that I left in 23 like the secondary considerations of obviousness, but I'm 24 pretty sure now they're all gone because there was no 25 testimony about them at all.
779 1 know, if I suggest we be able to look into that, because my 2 recollection is that initially Dr. Almeroth mentioned on 3 direct subject to confirmation that he couldn't talk to 4 Dr. Cooklev and he mentioned the protective order, he 5 mentioned the protective order. I think the protective 6 order was not raised in the question. 7 THE COURT: Even if that's the way it went, 8 Mr. Schuman, I mean, because there is only two 9 possibilities, one of which is the jury won't care at all 10 about the issue if we don't say anything about it, in which 11 case, fine, or they will care, in which case, we can tell 12 them not to care and, you know, they are presumed to follow 13 my instructions. And so I guess I kind of repeat my first 14 question which is: How is this at all harmful? And I take 15 it from your sort of response, that yeah, it's not harmful. 16 You just want to get something in return. 17 MR. SCHUMAN: Well, seeing this for the first 18 time, Your Honor, and of course, Dr. Walker's testimony was 19 just this morning, I would just characterize it as maybe we 20 would like a little time to make this a little bit more 21 neutral. 22 THE COURT: I'm not saying this is perfect 23 language. 24 MR. SCHUMAN: Right. 25 THE COURT: And so in that regard, that's a	781 1 MR. MURPHY: There was some testimony, Judge, 2 that relates to secondary considerations. 3 THE COURT: Well, you'll have to tell me about 4 that in a minute. 5 THE COURT: Okay. In terms of the jury 6 instructions, do you want a little time to caucus and look 7 at what I've handed out before we go over them or -- 8 MR. SCHUMAN: I think a short break would be 9 appreciated. That would be great. 10 THE COURT: So how long would you like? 11 Fifteen minutes? 12 MR. SCHUMAN: Yes. 13 THE COURT: Okay. Fifteen minutes. 14 MR. MURPHY: That's fine, Your Honor. 15 THE COURT: Okay. Great. 16 MR. MURPHY: Thank you. 17 DEPUTY CLERK: All rise. 18 (Recess was taken.) 19 DEPUTY CLERK: All rise. 20 THE COURT: All right. So let's go through the 21 jury instructions. 22 MR. SCHUMAN: May I be heard for one moment 23 before we do, Your Honor? 24 THE COURT: Sure, Mr. Schuman. 25 MR. SCHUMAN: This won't take long, but a little

782 1 disagreement on our team as to whether we need to make this 2 motion to preserve the record under Rule 50. So I'd like to 3 make a Rule 50 motion -- Rule 50(a) motion for judgment as a 4 matter of law in our favor on our invalidity case, Your 5 Honor. 6 I do appreciate the Court's comments in response 7 to Mr. Murphy's motion, but just very, very briefly with 8 respect to the certificates of correction, I think 9 Dr. Jacobsen provided sufficient evidence to support that 10 the change in the language of two of the three asserted 11 claims in the '882 and the '381 patent was not an obvious 12 typo or a clerical error. 13 And on the other side of the case, Dr. Cooklev 14 readily admitted that his testimony was just rank 15 speculation, that this was all a cut and paste error. 16 THE COURT: Well, I think actually there's 17 plenty of evidence there's a cut-and-paste error because of 18 the fact that the shred misspelling shows up in most of the 19 last paragraphs. 20 MR. SCHUMAN: Certainly, Your Honor, I 21 understand. 22 THE COURT: Sorry. I shouldn't have 23 interrupted. Go ahead. 24 MR. SCHUMAN: And then with respect to the prior 25 art case, invalidity, the 103, I think that the LB031	784 1 MR. SCHUMAN: Thank you, Your Honor. 2 THE COURT: So in terms of the jury 3 instructions, I guess the first thing -- so I have some 4 particular things that I have had further thoughts about. 5 One of the things that I want to do -- so what I'd like to 6 do is this: There's two things I'd like to do first, then I 7 would like you to just tell me whatever objections it is you 8 have. 9 The two things I'd like to do first is I would 10 like the parties to meet and confer afterwards and figure 11 out what claim constructions they actually want me to give 12 to the jury and to prepare them in an order that looks like 13 the kind of order I normally sign, but to just type my name 14 in as signing it. And don't bother dating it. And then I 15 will just attach it at the end of the instructions, and 16 they'll be there. And I can just refer to them, but I'm not 17 going to read them to them. It doesn't seem to me that 18 actually much depends in this case on the claim 19 constructions or at least as the case as just presented. 20 But in any event, I would like to have that. 21 And then the second thing is I would like to 22 very strongly request your consent to basically just giving 23 them the instructions A through K of part one which is 24 basically the stuff I covered in the preliminary 25 instructions. You know, I don't really want to tell them
783 1 reference, the evidence supports that every element other 2 than the shared memory which I think is in the preamble in 3 each of the claims is expressly disclosed. That was 4 Dr. Jacobsen's testimony. 5 And to a person of ordinary skill in the art, as 6 the Court recognized earlier, there's only two ways to do 7 memory in this context, discrete and shared memory. And 8 Dr. Jacobsen, a person of ordinary skill in the art, 9 provided evidence that a person of ordinary skill in the art 10 would have understood this could be done in either shared 11 memory or discrete memory. She provided other evidence as 12 well, but that's LB031, and as understood by a person of 13 ordinary skill in the art. And then she also testified 14 regarding the combination of Mazzoni and LB031, and 15 testified as to why a person of ordinary skill in the art 16 would be motivated to combine Mazzoni and LB031. So for 17 those reasons, Your Honor, we move for judgment as a matter 18 of law under Rule 50(a) in our favor with respect to 19 invalidity in the case of the prior art, all three of the 20 asserted claims in the case of the certificates of 21 correction, recognizing the Court's comments, the claims in 22 the '381 and '882 patents. 23 THE COURT: All right. Well, I'm going to deny 24 the motions. I think there are issues that should go to the 25 jury here, but the record is preserved.	785 1 again about witnesses, and rain drops, and things. You can, 2 of course, if it makes any difference in your closing 3 arguments refer to anything that's in there, but I would 4 prefer to just start tomorrow essentially on page 16 with 5 the summary of the patent issues. Is that agreeable to you 6 all? 7 MR. SCHUMAN: Agreeable to 2Wire, Your Honor. 8 MR. MURPHY: I'm just trying to understand, 9 Judge, so you would give that to them before the closing? 10 THE COURT: I'm going to give the instructions 11 other than the last three, four pages, I'm going to give 12 them whatever I'm going to give them before closing. But 13 what I would propose is that I not read pages 4 to 15, I 14 just tell them they're there, they're basically what I told 15 you at the beginning of the case. You should consider them 16 if those issues come up and the parties are free to refer to 17 them in closing argument if they want. 18 MR. MURPHY: Understood. No objection, Judge. 19 THE COURT: By the way, just in that regards -- 20 okay. Thank you. All right. That's what I'll do. 21 So in terms of objections, I guess we can start, 22 is there -- does either party have no objections? 23 MR. SCHUMAN: I think we have a few objections 24 on our side, Your Honor. 25 THE COURT: You have some objections, too,

786 1 Mr. Murphy? 2 MR. MURPHY: I believe we do, Judge. 3 THE COURT: Why don't we go, presumably, why 4 don't we go to page 16 and we'll see what the objections 5 are. 6 Are there any objections to page 16? 7 MR. MURPHY: No objection from TQ Delta. 8 MR. ONG: No objection. 9 THE COURT: All right. Page 17? 10 MR. MURPHY: No objection from TQ Delta. 11 MR. ONG: None for 2Wire, Your Honor. 12 THE COURT: So page 18, I would like to add at 13 the end of third sentence the phrase, "at the end of these 14 instructions", so the whole thing says, "The terms I have 15 construed and their meaning I have provided to you in a 16 separate order at the end of these instructions." 17 Is there any objection to the rest of page 18. 18 MR. ONG: No, none for 2Wire. 19 MR. MURPHY: None for TQ Delta. 20 THE COURT: How about for page 19? 21 MR. MURPHY: No objection for TQ Delta. 22 MR. ONG: No objection, Your Honor. 23 THE COURT: Okay. Page 20. 24 MR. MURPHY: No objection, Judge. 25 MR. ONG: None for 2Wire, Your Honor.	788 1 thing. I'm just curious, is there any evidence in the 2 record as to whether the PTO did or did not consider the 3 prior art? 4 MR. MURPHY: I personally was not here for the 5 entire trial, Judge. 6 THE COURT: So, Mr. Farnan, it's up to you to 7 have been paying attention. Do you know the answer to this? 8 MR. FARNAN: I don't think that's in evidence, 9 Your Honor. 10 THE COURT: What do you think, Mr. Schuman? 11 MR. SCHUMAN: So, Your Honor, it's on the face 12 of the patents which are in evidence that LB-031 were 13 considered by the examiners and Mazzoni. Certainly we will 14 consider raising that in closing arguments. 15 THE COURT: Okay. Do you think -- are the 16 patents -- so I'm going to leave the instruction in, but I 17 do think you have to be careful to make sure you don't start 18 testifying or providing expertise in closing arguments to 19 fill in, you know, understand what I'm saying? 20 MR. SCHUMAN: I do understand, Your Honor. 21 THE COURT: All right. So I'll leave that in. 22 Page 24. 23 MR. MURPHY: No objection from TQ Delta. 24 MR. ONG: No objection. 25 THE COURT: Page 25?
787 1 THE COURT: All right. So on page 21, the 2 second line I think there is a typo, it should say instead 3 of may be found for infringed, it should say may be found to 4 infringe. I would like to correct that. Other than that, 5 is there any objection? 6 MR. ONG: No objection, Your Honor. 7 MR. MURPHY: No objection, Your Honor. 8 THE COURT: Okay. Page 22, any objection? 9 MR. ONG: None, Your Honor, not for 2Wire. 10 MR. MURPHY: The only objection there, Judge, 11 was that correlates to the first proposed reference we made 12 -- I'm sorry, the second proposed we made to define what the 13 prior art is, it does not include copyright talks, but 14 otherwise the instruction itself, no objection. 15 THE COURT: Okay. I appreciate that. And I 16 just want to make sure the record is clear, you're referring 17 to the private conversations at a coffee break instructions 18 that were handed up twenty minutes ago. 19 MR. MURPHY: Yes, Judge. 20 THE COURT: So we understand each other. 21 So page 23, prior art considered or not 22 considered by the US-PTO, are there any objections here? 23 MR. ONG: Not for 2Wire, Your Honor. 24 MR. MURPHY: No objection, Judge. 25 THE COURT: So I always hate to mess with a good	789 1 MR. MURPHY: No objection from TQ Delta. 2 MR. ONG: No objection, Your Honor. 3 THE COURT: Page 26? 4 So beside for the question of secondary 5 considerations, is there any objection? 6 MR. ONG: Not for 2Wire, not other than that 7 one, Your Honor. 8 MR. MURPHY: No objection, Judge. 9 THE COURT: Okay. So why don't we just skip 10 ahead to the secondary considerations instruction which is 11 page 32. Mr. Murphy, which of these seven is there some 12 evidence in the record of that could support a finding, 13 because it is your burden to go forward on the secondary 14 considerations. 15 MR. MURPHY: Products covered by the claim, 16 commercially accessible due to the merits of the claimed 17 invention, Judge, the first one, number one, there was 18 testimony by Mr. Miller that they had worldwide sales of 19 millions of units of these products. There was testimony 20 from Ms. Divine about the cost, a big issue and the sales 21 and the success of such products. 22 Mr. Miller also testified about the reduction in 23 memory savings cost and the reduction of cost being a factor 24 in the success of products, so the commercial success, 25 Judge.

790 1 THE COURT: All right. Hold it, Mr. Ong. Does 2 that mean the other six, they're gone? 3 MR. MURPHY: Pardon me? 4 THE COURT: You're making arguments for 5 commercial success. I take it you're not making any 6 arguments for the other six? 7 MR. MURPHY: No, I'm sorry, Judge. I got 8 sidetracked. Long-felt need, Judge, we know from the 9 defendant's own prior art references that they said that 10 they were trying to work with memory, those products didn't 11 work. There was testimony that they tried to combine 12 references. 13 THE COURT: All right. Keep going. 14 MR. MURPHY: There was attempted solution to 15 fail, that's number three, tried and failed. Copying of the 16 invention is really just simple. 17 The number five, we withdraw. Five and six and 18 seven, we withdraw, Judge. 19 THE COURT: All right. So Mr. Ong, here's a 20 chance to argue something. What do you think about one 21 through four. 22 MR. ONG: I think we disagree with all of them. 23 So for number one, none of the testimony about any alleged 24 commercial success had what's properly tied. There's no 25 nexus to the claimed invention. There's no expert testimony	792 1 MR. ONG: Sorry, I think we might be on 33. 2 MR. MURPHY: Thirty-three. 3 THE COURT: Sorry. We skipped those pages, so 4 I'm backtracking. 5 MR. ONG: None up through 32 for us, Your Honor. 6 THE COURT: Oh, okay. Well, actually Page 29, 7 do you have any objections, Mr. Murphy, because Page 29, 8 there's a long and as usual, because of the nature of the 9 thing, incoherent paragraph about inherency. There's been 10 no testimony about inherency or anything like inherency. 11 And so I think that's just there to -- the only effect of 12 having that there will be to confuse the jury. 13 MR. MURPHY: I agree, Your Honor. 14 MR. ONG: We're fine with that, taking it out. 15 THE COURT: Okay. So that paragraph is out. 16 And so I heard the parties say they have no 17 objection to Page 31. We've gotten rid of Page 32. 18 On Page 33, my one minor typo I think is in the 19 last line. It says the certificate of corrections, 20 correcting that error is invalid. I think it should just be 21 singular, the certificate of correction, correcting that 22 error is invalid. 23 In terms of the substance of the instruction, 24 are there any objections? 25 MR. ONG: None for 2Wire.
791 1 on any of that, so we don't think that's properly tied so it 2 shouldn't be considered. 3 Long-felt need, again, I think for all four, 4 Your Honor, there's no proper nexus. And then specifically 5 with respect to number four, they precluded us from making 6 any argument about copying claimed invention or in the 7 opening statement, so I can't see how they should be able to 8 present that. 9 THE COURT: Okay. So I think there's no basis 10 for secondary considerations to go forward. I think Mr. Ong 11 hit the point right on the head in terms of nexus. You 12 know, there's some disjointed testimony out there that is 13 not tied together in any way that I think a jury could make 14 a finding that's necessary for that. 15 And I just don't think there's any evidence in 16 the record about the long-felt need for a solution about 17 others trying and failing. And I do think that just saying 18 the defendants infringe so that's evidence of copying, I 19 think actually copy here means copy, not infringe. 20 So I'm going to agree and strike that. And on 21 Page 26, get rid of number four, and just make it an and 22 after. So it will be one, scope of content; two the 23 differences; and three, the level of ordinary skill in the 24 art as of October 12th, 2004 and then a period. Okay. 25 Page 27, is there any objection?	793 1 MR. MURPHY: No, Judge. 2 THE COURT: Okay. And so then we're into 3 deliberations and verdict to the end. Are there any 4 objections to any of that? 5 MR. ONG: No, Your Honor. 6 MR. MURPHY: No objection. 7 THE COURT: Okay. All right. So Mr. Farnan, 8 have you got all this? 9 MR. FARNAN: Yes, Your Honor. 10 THE COURT: Okay. So you're going to meet and 11 confer or do something in the not too distant future. What 12 I'd like to do is to have some time, say, I don't know, 8:30 13 or earlier, if you can do it, but by 8:30 to send me a pdf 14 copy. Send it to the email address, Mr. Farnan, where I 15 will get it. That is, you know, Judge Richard Andrews. 16 MR. FARNAN: Yes, Your Honor. 17 THE COURT: Pdf version of what you have. And 18 if there's a dispute on -- well, I think I've ruled on 19 the -- no. I think I gave you both a chance to meet and 20 confer on both. And it will be helpful -- it can be very 21 informal. Just tell me where any remaining disputes are 22 relating, I guess, to these two things. 23 I think I've resolved everything else, and I 24 will promptly get back to you so that you can have the final 25 version to print up and deliver. Okay.

794 1 MR. FARNAN: Do you want the final jury 2 instructions filed, too? 3 THE COURT: You mean after I get back to you? 4 MR. FARNAN: Mm-hmm. Yes, Your Honor. 5 THE COURT: It depends, can I 100 percent count 6 on you getting them right? 7 MR. FARNAN: That's a lot, Your Honor. 8 MR. MURPHY: He did everything right for us, 9 Judge. 10 THE COURT: So if you can send everything for me 11 again as soon as you can, but I will wait around to get 12 them. I will check and make sure that I give you the go 13 ahead to print the 20 copies. Okay? 14 MR. FARNAN: Sure, Your Honor. And on the claim 15 construction order, do you want that in pdf, too? 16 THE COURT: Even though, if there's an error 17 there, it's going to be like transmission and receipt. I'm 18 not going to notice it. So that one I really am counting on 19 you. Okay? 20 MR. FARNAN: Yes, Your Honor. 21 THE COURT: And of course, it's going to be a 22 joint thing, so I'm counting on both sides. All right. 23 What about the jury verdict form? I've spent 24 less time on this, but here it is. If either side has 25 objections, I guess we'll start with plaintiff.	796 1 the part I took from you. 2 So but I did, while I was kind of looking at 3 this, wonder if that ought to be, you know, LB031, and the 4 knowledge of a person of skill in the art which is the way, 5 you know, people often say it. But the problem is that's 6 not really -- you know, it's like the one reference 7 obviousness calling the person of ordinary skill in the art 8 like a prior art. That doesn't work so well, either. 9 MR. MURPHY: That's right, Judge, which is why 10 we propose that other instruction about what isn't prior 11 art. So it is a little odd. I think we might have -- let 12 me confer with my -- can I confer with my co-counsel for 13 just two minutes? 14 THE COURT: Yeah. Yeah. Yeah. 15 MR. SCHUMAN: So Your Honor, may I be heard on 16 the verdict form briefly? 17 THE COURT: Well, why don't you give Mr. Murphy 18 a chance to confer first, just so he hears what you say. 19 MR. SCHUMAN: Of course, Your Honor. 20 THE COURT: And so before you speak, Mr. Murphy, 21 just to be clear, Mr. Farnan, on the claim construction 22 order, if there's a plain meaning construction, don't 23 include that. 24 MR. FARNAN: Yes, Your Honor. 25 THE COURT: Okay. Yes, Mr. Murphy, you were
795 1 Mr. Murphy. 2 MR. MURPHY: For the record, Your Honor, our 3 general objection, I believe this was the form submitted by 4 2Wire. We submitted a separate form. 5 THE COURT: Well, so let's say that's the case, 6 but as a general objection, part of the reason, and I don't 7 mean this directed to you in particular, Mr. Murphy, is you 8 know, the reason you submitted two forms is because of 9 stylistic differences not because of substantive 10 differences. So I have to pick one style over the other. 11 And so right now all you've done is preserve a 12 style objection. If there's anything else you want to 13 object to, go ahead. 14 MR. MURPHY: Judge, there is on Page 5, Item 10. 15 THE COURT: Yeah. 16 MR. MURPHY: Circle any prior art combination of 17 2Wire's equipment. Item A, there is no combination, so -- 18 THE COURT: Well, that's an excellent 19 observation, and I believe that this was the question that 20 we carried over from yours to theirs. Right? 21 MR. MURPHY: That I don't recall, Judge. 22 THE COURT: So Sarah, am I right about that? 23 (Discussion was held off the record:) 24 THE COURT: So this was actually your suggestion 25 of the everything else. The only part you objected to is	797 1 going to confirm and then say what? 2 MR. MURPHY: We'll withdraw my objection to this 3 and the way this is worded is fine with us. 4 THE COURT: Okay. So Mr. Schuman, you had 5 something you wanted to bring up? 6 MR. SCHUMAN: Yes, Your Honor. I think on the 7 infringement questions, I think the way the evidence came 8 in, both parties regularly referred to these groupings based 9 on the Broadcom chip numbers. I think either referencing, 10 somehow referencing the Broadcom chip numbers whether it's 11 in a parenthetical or referring to it by products that use 12 this chip, either way, I think that would be helpful. 13 The jury I think has only seen in passing, for 14 example, I think Dr. Almeroth had a slide that obviously 15 focused on these two chips, but then had images of the 16 products grouped together at the top. So I think it would 17 be helpful to the jury to have some reference to the 18 Broadcom chips in the infringement questions. 19 THE COURT: What do you say to that, Mr. Murphy, 20 because from helping the jury, all that sounds like 21 something that might be a good suggestion. 22 MR. MURPHY: I don't disagree with that, Judge. 23 What I would like to do is meet and confer and get the 24 wording correct, but I don't disagree in principle. 25 THE COURT: By the way, what's going to happen,

798 1 we have the two versions we're working from. I'm going to 2 e-mail them to Mr. Farnan and Mr. Barillare just as soon as 3 we're finished here so you won't have to type from scratch 4 or cut and paste. Who knows what can happen with that. 5 Anything else, Mr. Schuman? 6 MR. SCHUMAN: Yes, Your Honor, on the 7 obviousness questions. 8 THE COURT: Yes. 9 MR. SCHUMAN: I think that the same question 10 with question 10 that we were just having colloquy with 11 Mr. Murphy about, I think the question as written is 12 confusing, and so we would object to the question. I think 13 that the question below it is fine, the question below it is 14 for a different patent. Let's take question 9, I think 9 15 goes with 10, question 9 ask the jury has 2Wire proved by 16 clear and convincing evidence that claim 5 of the '381 17 patent is invalid and obvious, check yes or no. I don't 18 think the further question is necessary and I also think 19 it's confusing. And the same thing would go for each of the 20 other questions on the obviousness. 21 THE COURT: Here is the thing. I think from the 22 point of view of -- or I may not be right about this, but 23 from the point of view of whatever the obviousness verdict 24 is, people are going -- somebody is going to think it's 25 wrong, and I think that it's helpful to have the -- if there	800 1 THE COURT: Well, we will send the verdict form 2 to counsel shortly. I will be paying attention to my e-mail 3 for whatever you're able to work out as much as you can. 4 And if you can't work something out, I will -- the ideal 5 thing if you can't work something out is I have your best 6 suggestion in one line and your best suggestion on like the 7 next line, and then it's easy for me to tell Mr. Farnan and 8 Mr. Barillare which one I want to do. Okay? So are we 9 good, then? 10 MR. MURPHY: Yes, we are, Judge. 11 THE COURT: How long are we doing closing 12 arguments? You may be at a disadvantage here, Mr. Murphy. 13 MR. MURPHY: I am, Judge. I apologize for that. 14 THE COURT: I am surprised Mr. Schuman is 15 hanging around as opposed to going off and doing something. 16 MR. MURPHY: I'm sorry, Judge, I don't have a 17 firm answer for you. 18 THE COURT: Let me see what Mr. Schuman says. 19 What were you thinking? 20 MR. SCHUMAN: I was thinking in the 30 to 45 21 minute range at most. I think that's consistent with what 22 we talked about during the pretrial conference. 23 THE COURT: I don't think we -- did we talk 24 about closing arguments at the pretrial conference? 25 MR. SCHUMAN: I think the Court gave some
799 1 is a vote that it is obvious, to have whatever it is that 2 the jury thought was the right theory, so that's the reason 3 why we put it in. But it could also be -- but I have also 4 seen this done where question 10 would be sort of like a 5 subpart question 9, so it's just one question. 6 So I'm perfectly happy to let you all try to 7 improve upon this. Do you have anything to say about this 8 Mr. Murphy? 9 MR. MURPHY: I do agree with what you said 10 originally, Judge, I think when a decision is made, both 11 sides need to know or want to know what the underlying 12 decision was and what it stemmed from. The appellant court 13 wants to know. 14 THE COURT: In terms of Mr. Schuman saying maybe 15 a little -- 16 MR. MURPHY: If it's just a format issue, we can 17 look at that. 18 THE COURT: Why don't you see about that. 19 MR. SCHUMAN: I think we can meet and confer 20 about the other part of the verdict form. We can work that 21 out as well. 22 THE COURT: Mr. Schuman, is there anything else 23 you want to bring up? 24 MR. SCHUMAN: I think those are the only points 25 on this version of the verdict form.	801 1 general observations. 2 THE COURT: I think I said the last time I saw a 3 defendant win they only took 35 minutes. 4 MR. SCHUMAN: I heard something similar but 5 maybe not exactly that. The closing argument 30 to 45 6 minutes is an estimate. I think you gave us at an outer 7 bound I think you said an hour. 8 THE COURT: That would be my thing. 9 Mr. Chiplunkar. I don't know who you are. 10 MR. CHIPLUNKAR: Mr. Chiplunkar. 11 THE COURT: The woman sitting at the table. 12 MR. MURPHY: Ashley Ratycz. 13 THE COURT: I'm sorry, I seen your name on the 14 paper. Do you have any idea what Mr. McAndrews was thinking 15 about. 16 MS. RATYCZ: From my understanding he wanted 17 about an hour, but we would definitely like to confirm that 18 with him if that's okay with you. 19 THE COURT: So why don't you confirm that with 20 him. I'm kind of thinking that there is only so much you 21 can do with slightly more than two-and-a-half days of 22 testimony, so I'm kind of thinking 45 minutes is -- 45 23 minutes would be a better presentation than an hour in this 24 case in my opinion. So that's what I'm leaning to. But if 25 Mr. McAndrews says I can't do it in less than an hour, I

1 will probably try to gain some more data points as to
2 whether this hour for the plaintiff, 35 minutes for the
3 defendant, does it always work out the defendant wins then,
4 but I don't have enough data points on that yet. Okay.

5 So when you find out, send me an e-mail saying
6 what Mr. McAndrews wants. But if he's ambivalent or I don't
7 get an e-mail in a while, I'll go with 45 minutes.

8 All right. Anything else?

9 MR. MURPHY: No, Judge.

10 MR. SCHUMAN: Not from 2Wire, Your Honor.

11 THE COURT: Thank you for your time and
12 attention on this. And we'll get you an e-mail and I'll be
13 watching my e-mail.

14 (Court recessed at 5:32 p.m.)

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