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UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD

NOKIA OF AMERICA CORPORATION,)
)
Petitioner,)
)
vs.)Case IPR2023-00960
)U.S. Patent No. 8,238,754
ALEXANDER SOTO AND WALTER)
SOTO,)
)
Patent Owners.)
)
)
_____)

VIDEOTAPED REMOTE DEPOSITION OF
Paul Prucnal, Ph.D.
(Taken by Patent Owners)
Saturday, June 29, 2024

Reported in Stenotype by
Kristy L. Clark, RPR, NV CCR #708,
CA CSR #13529, NC Notary #201807900150

Veritext Legal Solutions Job No. CA671942

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4	MATTHEW WELCH, ESQUIRE	4	By Ms. Riolo 155
5	Alston & Bird, LLP	5	
6	1120 South Tryon Street	6	INDEX TO EXHIBITS
7	Suite 300	7	NUMBER DESCRIPTION MARKED
8	Charlotte, North Carolina 28203	8	Exhibit 1 Declaration of Dr. 19
9	(704) 444-1284	9	Paul R. Prucnal in
10	mary.riolo@alston.com	10	Support of
11		11	Petition for Inter
12		12	Partes Review of
13	ON BEHALF OF THE PATENT OWNERS:	13	U.S. Patent No.
14	QI TONG, ESQUIRE	14	8,238,754
15	RUSS AUGUST & KABAT	15	Exhibit 2 Opening Expert 21
16	4925 Greenville Avenue	16	Report of Dr. Paul
17	Suite 200	17	Prucnal Regarding
18	Dallas, Texas 75206	18	Invalidity of U.S.
19	(310) 826-7474	19	Patent No.
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2	a witness called on behalf of Patent Owners, before	2	NUMBER DESCRIPTION MARKED
3	Kristy L. Clark, Registered Professional Reporter and	3	Exhibit 8 SFP MSA 82
4	Notary Public, in and for the State of North Carolina,	4	Specification
5	on Saturday, June 29, 2024, commencing at 9:32 a.m.	5	Agreement
6		6	Exhibit 9 Demonstrative 99
7		7	PowerPoint file
8		8	Exhibit 10 Exhibit 1012, SFF 137
9		9	& SFP Optical
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2 (Pages 2 - 5)

1 PROCEEDINGS 2 -oOo- 3 4 THE VIDEOGRAPHER: Stand by. 5 Good morning. This is Media Unit 1 in the 6 video-recorded deposition of Dr. Paul Prucnal, in the 7 matter of Nokia of America Corporation versus Walter 8 Soto and Alexander Soto, filed in the United States 9 Patent and Trademark Office, Case No. IPR2023-00960. 10 And this deposition is being conducted 11 remotely, using virtual technology. My name is Andrew 12 Smith, representing Veritext, and I'm the videographer. 13 And our court reporter is Kristy Clark, also from 14 Veritext. 15 At this time, starting with our noticing 16 attorney, would all counsel please identify themselves, 17 after which our court reporter will swear in the 18 witness. 19 MR. TONG: This is Peter Tong from Russ 20 August & Kabat on behalf of the patent owners. 21 MS. RIOLO: And this is Mary Riolo of Alston 22 & Bird on behalf of petitioner, Nokia of America 23 Corporation, and I'm joined by my colleague, Matthew 24 Welch. 25 ///// Page 6	1 Q. Are they in the same room as you or are they 2 in a different room? 3 A. They're in the same room. 4 Q. Okay. I would request that other counsel 5 turn on their cameras, just so I can see you and make 6 sure you're not making faces at them. 7 MR. WELCH: Peter, do you want our cameras on 8 the entire time? 9 MR. TONG: Generally, yes. 10 MR. WELCH: Okay. 11 BY MR. TONG: 12 Q. Your counsel may object from time to time, 13 and as long as they do not instruct you not to answer, 14 you must answer the question. 15 Do you understand? 16 A. Yes. 17 Q. Is there any reason why you cannot give 18 truthful and complete testimony today? 19 A. No. 20 Q. Are you on any drugs, medication, alcohol, 21 anything that could affect your cognitive ability to 22 give truthful and complete testimony today? 23 A. No. 24 Q. So you've been offered as an expert in this 25 IPR and in a co-pending district court litigation; Page 8
1 Thereupon-- 2 PAUL PRUCNAL, PH.D., 3 was called as a witness, and having been first duly 4 sworn, was examined and testified as follows: 5 6 DIRECT EXAMINATION 7 BY MR. TONG: 8 Q. Good morning, Dr. Prucnal. 9 A. Good morning. 10 Q. I take it you have been deposed before? 11 A. I have. 12 Q. So you're quite familiar with the rules and 13 what you're supposed to do in a deposition? 14 A. Yes. 15 Q. All right. If it's okay with you, I'd like 16 to go over a few of those rules anyway. 17 If you need to take a break from time to 18 time, that's perfectly okay. Just let us know, but we 19 won't take a -- a break in the middle of a question. 20 Is there anybody else in the room with you 21 today? 22 A. No. 23 Q. Okay. 24 A. Just counsel. Just the two attorneys that 25 identified themselves. Page 7	1 correct? 2 A. Yes. 3 Q. What is your field of expertise? 4 A. My field of expertise generally is electrical 5 and computer engineering. And more specifically, my 6 research is in the field of photonics. 7 (Clarification by the reporter.) 8 BY MR. TONG: 9 Q. And what experience do you have that 10 qualifies you as an expert in the field of photonics? 11 A. Well, I got my Ph.D. in this area many years 12 ago. I've done research as a professor at Columbia 13 University and Princeton University in this field for a 14 number of decades. I've published many hundreds of 15 research -- research papers and given hundreds of talks 16 at conferences in this field. 17 Also, I'm a fellow of the triple E, which is, 18 the electrical engineering organization for 19 professional electrical engineers and my fellow -- my 20 fellow appointment was because of my work in the area 21 of optical networks and photonic switching. I could go 22 on if you'd like. 23 Q. That's good for now. 24 Have you ever designed, developed, or made an 25 optical transceiver? Page 9

1 MS. RIOLO: Objection. Form. 2 THE WITNESS: Yes, as part of my research in 3 my minor research laboratory, the work involves optical 4 transceivers, many of which we design and build. 5 Also, I didn't mention earlier that my 6 experience in photonics is also through my consulting 7 work, my consulting work in industry, and some of that 8 work has involved optical transceivers. 9 BY MR. TONG: 10 Q. And in what years was -- did that work 11 involving optical transceivers take place? 12 A. Pretty much from the beginning of my research 13 at Columbia, which started way back in 1979, my 14 earliest papers involved optical transceivers and 15 modulation, and I would say that that has been a -- a 16 theme that has persisted throughout years that's been 17 part of almost everything we do. 18 Q. Have you ever designed, developed, or made an 19 optical transceiver module? 20 MS. RIOLO: Objection. Form. 21 THE WITNESS: I have not built an optical 22 transceiver module in the sense that we are talking 23 about in this case, but I certainly have studied them. 24 BY MR. TONG: 25 Q. And when you say "optical transceiver Page 10	1 THE WITNESS: Mic is in the camera? Can you 2 hear me okay now? 3 MR. TONG: Yes, we can hear you okay now. 4 THE WITNESS: I think when I'm looking at 5 you, I'm not looking at the camera, so that's why I'm 6 slightly looking on the side. 7 But as I was going to say, my work, reaching 8 back to the 1990s, was in an area called photonic 9 switching, where -- where a lot of it dealt with 10 network switches. 11 BY MR. TONG: 12 Q. Did you work on the photonic and electrical 13 interface of those switches or did you work more on the 14 L2 switching aspect? 15 A. Well, I -- I think it was both. I think -- I 16 think it both related to the multiplexing, the routing, 17 but -- but also, the -- the interface between the 18 optics and the electronics as well. 19 Q. Have you ever worked on designing, 20 developing, or making a router? 21 MS. RIOLO: Objection. Form. 22 THE WITNESS: Again, my work in photonic 23 switching related to developing routing protocols and 24 demonstrating the routing of packets involving optical 25 switches. Page 12
1 module," do we have a shared understanding that that 2 refers to modules such as the SFP module or the XFP 3 module? 4 A. Yes, yes. In fact, more generally, I would 5 say that I have been involved in the design and 6 implementation of transceiver modules, but I was, in 7 fact, referring to the pluggable type modules that are 8 at issue in this case. 9 Q. Thank you. 10 And could you explain to the Board what is 11 the difference between a pluggable optical transceiver 12 module and a general optical transceiver. 13 A. I say the main difference is the form factor. 14 Q. Have you ever designed, developed, or made a 15 networking switch? 16 MS. RIOLO: Objection. Form. 17 THE WITNESS: Like my early research was 18 related to switching, going back to the 1990s, as I 19 mentioned my citation for the I triple E fellow 20 [inaudible]. 21 MR. TONG: Sir, you're cutting out. Could 22 you speak closer to the mic. 23 THE WITNESS: Okay. Not sure. Is that the 24 mic right there in front of me? 25 MS. RIOLO: I think it's in the camera. Page 11	1 Q. And was your work there focused on the 2 optical electrical interface or was it focused on the 3 layer three routing aspect? 4 A. Well, there, in addition to the optical two 5 electrical interface, the critical problem that we were 6 studying was the ability to do routing on the fly, 7 which meant reading packet headers, identifying an 8 output port of the router and also resolving any 9 contention or conflicts, so we -- we -- the running 10 itself was involved as a key part of the research. 11 Q. Was there a particular product that was at 12 issue in that research? 13 A. No. 14 Q. So I want to ask you at what level of 15 networking was that research focused on, and to clarify 16 what I mean by the level of networking, I'm talking 17 about from -- you have LAN on one end and you've got 18 broadband access and long haul and WAN on the other 19 end. 20 Do you understand what I mean by -- when I 21 use those terms? 22 A. Well, I think you're classifying the networks 23 in terms of their size, ranging from LANs to Metro to 24 WANs to long haul? 25 Q. Correct. So my question to you is: Which Page 13

1 level of networking was your research focused on? 2 A. Okay. Well, I would say that early on, I was 3 primarily interested in optical LANs. That would have 4 been some of my first research at Columbia. And I 5 think as that progressed, my interest moved more toward 6 the switching and routing that we discussed a few 7 minutes ago. And that would apply to LANs, but also 8 to -- to WANs, to routing and wide area networks. 9 I think somewhere -- sometime after that, my 10 interest turned to Metro, and of course, they're 11 different technologies required for Metro networks. 12 So I think to answer you overall, my interest 13 in everywhere from -- from local area networks through 14 metropolitan area networks, and MANs and on the way up 15 to WANs, and I think that -- that that covers it. 16 Q. I'm sorry. Just to clarify what you said in 17 that last part, you said and MANS? And all the way up 18 to WANS. What is MANs, M-A-N-S? 19 A. Oh, metropolitan area networks. 20 Q. Thank you. 21 A. Welcome. 22 Q. Could you explain the difference between a 23 LAN, local access network, and a MAN, a metro access 24 network? 25 A. Well, there are lots of differences. I'm not Page 14	1 MR. TONG: That's -- 2 THE WITNESS: Could you explain that? I'm 3 sorry. 4 BY MR. TONG: 5 Q. Yeah. Sorry. Let me rephrase. 6 Would that be a representative scale of the 7 size of a LAN, the example of people in a building with 8 their phones and laptops connecting to a router? 9 MS. RIOLO: Object to form. 10 THE WITNESS: I think a number of people in a 11 building connected to a switch or router hypothetically 12 could be a LAN. 13 BY MR. TONG: 14 Q. And could you explain the difference between 15 a LAN and a broadband access network? 16 A. Could you please describe the parameters of 17 the access network you're thinking of in a little more 18 detail? 19 Q. Is it fair to say that a broadband access 20 network is the part of the network that would extend 21 from that hypothetical switch or router in a building 22 to an internet service provider? 23 MS. RIOLO: Object to form. 24 THE WITNESS: So you're generally talking 25 about an access network of some kind and something on Page 16
1 quite sure where to start. There would be differences 2 in terms of generally speaking. But I'm not sure I'll 3 get all the differences, but in terms of geographic 4 extent, there would be differences in the number of 5 users. And generally, there would be differences in 6 the amount of throughput that's required. Those are 7 some -- I'm sorry. I was just going to say, those are 8 some of them, but they come to mind. 9 Q. Sure. Would an example of a LAN be my 10 personal laptop and cell phone collect- -- connecting 11 to the switch in my room or the -- the wireless router 12 in my room? Would that be an example of a LAN? 13 MS. RIOLO: Object to form. Incomplete 14 hypothetical. 15 THE WITNESS: I think LANs can have lots of 16 forms. I'm not -- I'm not sure that -- it would depend 17 on the details of what you're describing. I think of a 18 local area network as, for example, connecting users on 19 a campus or in a building could be a LAN. 20 BY MR. TONG: 21 Q. Okay. Thank you for that. So that -- that 22 sounds like a good sense of the scale of a LAN. People 23 in a building with their phones and laptops connecting 24 to a router in the building? 25 MS. RIOLO: Object to form. No question. Page 15	1 the edge? 2 BY MR. TONG: 3 Q. Yeah, broadband access network. 4 A. And what was your question about the 5 broadband access network? 6 Q. Is it fair to say that that would be a part 7 of the network that extends from a switch or router in 8 a building to the internet service provider? 9 MS. RIOLO: Object to form. 10 THE WITNESS: I would classify a broadband 11 access network as a network that extends from a 12 provider or from a central office to the edge of the 13 network, and at the edge of the network, it could be 14 connected to other things. 15 BY MR. TONG: 16 Q. Would an example of the edge of the network 17 be a router in an office building? 18 A. This is very hypothetical. I -- I'm not sure 19 whether I can make a general statement about that, but 20 I suppose it could be. 21 Q. Okay. Thank you. I'm just trying to get 22 some background information of the parts of the 23 different network as we scale up from a LAN to a WAN. 24 These questions aren't meant to trick you in any way, 25 if that makes you feel a little bit better. Page 17

1 Could you describe what part of the network 2 is a metro access network? 3 A. Again, I think the absolute boundaries and 4 definitions of these types of networks aren't 5 necessarily absolute. But in the area of a metro 6 access network, that would generally be spanning an 7 area the size of a city. 8 Cities, of course, vary greatly in size, but 9 I would visualize it as a metropolitan area network -- 10 a metropolitan area, I should say, New York, Chicago, 11 San Francisco, this type of thing. 12 And we -- the role of the metro network would 13 be to interconnect a number of nodes, such as central 14 offices, and carry data -- fairly high speed data, 15 fairly high throughput, from node to node, from central 16 office to central office, where data can be added and 17 dropped. 18 Q. Thank you. 19 And can you describe what part of the network 20 is the long haul network? 21 A. The long haul network can spanned -- span 22 distances between cities. It can span the country, the 23 continent. It can span the entire globe. And so 24 that -- those long haul -- or long-reach lengths are 25 going to come off of routers or central offices to span Page 18	1 I think that you introduce them on your end, and then 2 he will have access to them, and so will everyone else 3 who has Exhibit Share. 4 MR. TONG: Okay. 5 THE WITNESS: For your information, I do have 6 another screen that has exhibits on it -- a list of 7 exhibits, and I see that exhibit on my screen. 8 MR. TONG: Okay. Thank you. 9 BY MR. TONG: 10 Q. So this is Exhibit Prucnal 001. Do you 11 recognize this exhibit? 12 Sorry. Prucnal. Did I get that right? 13 A. That's -- that's correct. Thank you. Thank 14 you. 15 Q. Do you recognize this exhibit? 16 A. I've opened it up, and I'll just flip through 17 it. (Witness reviewing document). It's a bit time 18 consuming to scroll through this on the screen, which 19 is what I'm doing now to make sure that I recognize all 20 of it. 21 THE WITNESS: I have a hard copy of this, if 22 you would prefer me to look at that. I think it would 23 be a lot quicker for me to flip through than this. But 24 I'll do either. 25 MR. TONG: Whatever's easy for you, Page 20
1 the difference -- the distance to other cities. 2 Q. And what about a wide area network? 3 MS. RIOLO: Object to form. 4 THE WITNESS: To me, a long haul network -- a 5 wide area network would be the overall network that is 6 interconnecting things over -- over a large area, like 7 the size of a continent, for example. Whereas the long 8 reach transmission lengths are the actual links in 9 between it. So a long haul network and a -- and a wide 10 area network, I don't have a distinction in my own 11 mind. 12 BY MR. TONG: 13 Q. Okay. Fair enough. Thank you. 14 I'm going to go ahead and introduce the first 15 exhibit. 16 (Defendants' Exhibit 001 was marked.) 17 BY MR. TONG: 18 Q. This should be your declaration from the IPR. 19 MR. TONG: Could we please get this 20 introduced and marked? 21 Do you have access to the -- I don't know 22 what the process is online. Is the court reporter 23 going to introduce these exhibits or do you -- do you 24 get a link to download them? 25 THE VIDEOGRAPHER: This is the videographer. Page 19	1 Dr. Prucnal. 2 THE WITNESS: I think -- I think it will 3 actually be quicker for me to look through my hard 4 copy. Yeah. 5 And, of course, the hard copy I have in front 6 of me I know is my declaration in this case, and at 7 least the first part of this on the screen that I've 8 looked through corresponds to that. 9 BY MR. TONG: 10 Q. And if you flip toward the end, does that 11 appear to be your signature? 12 A. The computer's having a bit of trouble 13 loading this document, so that as I -- as I flip 14 through it, sometimes it becomes unstable and goes very 15 fast, and sometimes it goes very slowly. Is there a 16 way to do it just by -- by turning this thing on the 17 mouse? I think -- right I'm supposed to be ... 18 MS. RIOLO: Grab the bar inside. 19 THE WITNESS: Oh, I can grab the bar. Okay. 20 Okay. I'll grab the bar. Oh, that helps. Okay. 21 Okay. I see my signature at the end. 22 MR. TONG: We can set that exhibit aside for 23 the moment. We're going to come back to it. I'm going 24 to introduce Exhibit Prucnal 002. 25 ///// Page 21

1 (Defendants' Exhibit 002 was marked.) 2 BY MR. TONG: 3 Q. And this is titled Opening Expert Report of 4 Dr. Paul Prucnal Regarding Invalidity of U.S. Patent 5 No. 8,238,754. It bears the designation, "Restricted - 6 Attorneys' Eyes Only" at the top. However, by 7 agreement of counsel, both parties are de-designating 8 this document in its entirety. 9 Are you able to access a copy of this expert 10 report? 11 A. Well, I clicked on the exhibit on the screen, 12 and it hasn't opened and it's giving me a message 13 saying, "generating the file preview, may take a 14 while." 15 Q. Okay. Let's give it a while then. 16 A. Okay. 17 Q. Do you have a copy of this in your binder? 18 A. I don't think I do. 19 MS. RIOLO: He does not. 20 THE WITNESS: No. I don't. 21 BY MR. TONG: 22 Q. Do you have an option to download this and 23 open it up natively? 24 A. Don't know. 25 MS. RIOLO: I don't think he does, Peter. He Page 22	1 And I object to coaching the witness in the 2 middle of a question. 3 BY MR. TONG: 4 Q. In this, could you please turn to paragraph 5 six. 6 A. (Witness complies.) Okay. 7 Q. This section is titled summary of your 8 conclusions; correct? 9 A. Yes. 10 Q. And the last sentence of paragraph six, could 11 you read it into the record for us? 12 A. "It is also my opinion that under NextGen's 13 apparent theory of infringement, the Asserted Claims 14 are invalid under 35 U.S.C. 112 for failure to meet 15 both the written description and the enablement 16 requirements." 17 MS. RIOLO: I want to object to that previous 18 question as being outside the scope. 19 BY MR. TONG: 20 Q. If we turn to paragraph two of this report, 21 could you tell us which claims are referred to as "the 22 Asserted Claims" in this report? 23 A. I have been informed that NextGen has 24 asserted claims 1 through 16, and 18 through 30 of the 25 '754 patent. Page 24
1 doesn't. 2 THE VIDEOGRAPHER: This is the videographer. 3 If you want, you can, as you publish them, put the 4 exhibits in the chat and then he'll be able to download 5 from there natively. But up to you either way. 6 MR. TONG: Okay. I am going to try that 7 course of action. I am trying to add this to the chat 8 window, but I don't think I can upload files into the 9 chat window. All right. 10 THE WITNESS: Just for your information, the 11 document just opened the preview. 12 BY MR. TONG: 13 Q. Okay. Do you recall preparing an expert 14 report in the litigation NextGen Innovations versus 15 Nokia of America Corporation, Case 2:22-cv-309 in the 16 Eastern District of Texas? 17 A. Yes. 18 Q. And can you confirm that this is a copy of 19 that expert report that you had prepared in that 20 litigation? 21 MS. RIOLO: You can take your time to review 22 it. 23 THE WITNESS: (Witness reviewing document.) 24 Looks like my report from last December. 25 MR. TONG: Thank you. Page 23	1 Q. Thank you. 2 Can you please turn to paragraph 44 of this 3 report. 4 A. Okay. 5 Q. This is a section under the heading 6 Enablement and Written Description; correct? 7 A. Yes. 8 Q. And in the section from paragraph 44 to 51, 9 is this where you set forth your understanding of what 10 the requirements of enablement and written description 11 are? 12 MS. RIOLO: Objection. Outside the scope. 13 MR. TONG: I will generally accept that you 14 have a standing objection to all enablement questions 15 in this report. 16 MS. RIOLO: That's fine. 17 THE WITNESS: (Witness reviewing document.) 18 I haven't read it all and don't recall all 19 the details, but to answer your question, this does 20 look like a section that describes what enablement and 21 written description is. 22 BY MR. TONG: 23 Q. Okay. If we -- 24 MR. TONG: Sorry. Did someone say something? 25 MS. RIOLO: No. Page 25

1 BY MR. TONG: 2 Q. If we scroll down to paragraph -- going to be 3 around 900. 905. 4 MS. RIOLO: I just want to clarify on the 5 record that petitioner makes a standing objection to 6 all questions about the expert report. Not just 7 written enable -- and enablement. 8 MR. TONG: Okay. Thank you. 9 THE WITNESS: Okay. I reached paragraph 905. 10 BY MR. TONG: 11 Q. And this is under a heading, quote, 12 Invalidity of the '754 patent Based on Section 112; 13 correct? 14 A. Yes. 15 Q. And this section, from 905 to paragraph 910, 16 sets forth your analysis of the invalidity of the '754 17 patent based on Section 112; correct? 18 MS. RIOLO: Objection. Form. Again. 19 THE WITNESS: It's been a long time since I 20 looked at this report; so I'm going to need to actually 21 go through this to answer your question. 22 BY MR. TONG: 23 Q. Yes. Please go ahead and read the five 24 paragraphs. 25 A. Okay. I've gone through it at a level Page 26	1 but the page itself is not numbered. It looks like it 2 has your conclusion and your signature. 3 A. I see the page with my conclusion and my 4 signature, but I don't see paragraph 913 that you 5 mentioned. 6 Q. Yes, this paragraph is not actually numbered; 7 you're correct. 8 These were your opinions as of December 15th, 9 2023; correct? 10 MS. RIOLO: Object to form. Leading. 11 (Clarification by the reporter.) 12 MR. TONG: And I'm going to object that 13 leading is not an improper -- leading is not a proper 14 objection on cross-examination. 15 BY MR. TONG: 16 Q. Please go ahead and answer the question. 17 A. So my conclusion is that the asserted claims 18 of the '754 are invalid, and this was described in my 19 report of -- and it was my opinion as of when I signed 20 the report, which is December 15th, 2023. 21 Q. Okay. Thank you. We can set this document 22 aside for now. 23 Will you please turn to Prucnal Exhibit 1. 24 A. Okay. 25 Q. If you could turn -- if you could turn to Page 28
1 sufficient to say that this is my discussion of written 2 description and enablement. 3 Q. And you -- could you please read paragraph 4 910 into the record. 5 A. "Therefore, because the patents are 6 noticeably devoid of any description sufficient to 7 teach a PHOSITA how to make the claimed functional 8 components within the pluggable optical transceiver 9 module, and because even the inventors themselves 10 admittedly couldn't produce a working prototype, a 11 PHOSITA would not have been able to utilize the alleged 12 invention." 13 MS. RIOLO: And I just want to object because 14 this document has not been admitted as an exhibit in 15 the underlying PTAB proceeding. 16 MR. TONG: Sorry. In the underlying what 17 proceeding? 18 MS. RIOLO: In the PTAB proceeding, the IPR. 19 MR. TONG: Okay. Well, we are seeking to 20 admit this as an exhibit, and we intend to file it as 21 an exhibit. 22 MS. RIOLO: Okay. 23 BY MR. TONG: 24 Q. Dr. Prucnal, could you please turn to below 25 paragraph 913 on page -- I guess it would be page 324, Page 27	1 paragraph 29 for us. 2 A. Okay. 3 Q. So in this paragraph, you say that you were 4 informed for purposes of this matter, the earliest 5 claimed priority date was October 30th, 2023; correct? 6 A. Yes. 7 Q. Did you do any independent analysis of what 8 the earliest claimed priority date was? 9 A. Can you explain, please, a little more what 10 you mean by that? 11 Q. Yeah. So your report says that you were 12 informed, presumably by counsel or someone else, 13 whoever it was, that the earliest claimed priority date 14 was October 30th, 2023. 15 Aside from someone telling you this, is there 16 anywhere in your report that you actually do the full 17 complete priority date analysis? 18 MS. RIOLO: I'm going to object to that as 19 calling for a legal conclusion. 20 THE WITNESS: (Witness reviewing document.) 21 I don't recall whether I did a priority date 22 analysis in my report. 23 BY MR. TONG: 24 Q. Could we please turn to page 10 of your 25 report. Page 29

1 A. Okay. 2 Q. On the top of this page, it is titled Legal 3 Standards; correct? 4 A. Yes. 5 Q. And this section spans from paragraph 35 6 through 44? 7 A. Yes. 8 Q. And this section generally sets forth the 9 legal standards that you applied in your analysis; 10 correct? 11 A. I see that's my understanding, yes. 12 Q. Let's turn to paragraph 44. 13 A. Okay. 14 Q. The first sentence says that, "I understand 15 that absent evidence of an invention date prior to the 16 filing date of a patent, the invention date of the 17 patent is presumed to be its filing date." 18 Did I read that correctly? 19 A. Yes. 20 Q. Which filing date did you use in your 21 analysis in this report? If any. 22 A. It was the -- it was the date that we saw in 23 the previous paragraph we looked at about the filing 24 date. 25 Q. That was paragraph 29? Page 30	1 MS. RIOLO: Objection. Calling for legal 2 conclusion. 3 THE WITNESS: I don't know whether I have any 4 further analysis in my report about this. 5 BY MR. TONG: 6 Q. Okay. Thank you. 7 I'm going to -- 8 Did someone say something? 9 MS. RIOLO: No. 10 BY MR. TONG: 11 Q. Okay. Did you guys hear -- hear that or am I 12 just hearing weird sounds every once in a while? 13 A. I didn't hear anything. 14 Q. Okay. I'm going to go ahead and mark the 15 next exhibit and introduce it. It's going to be 16 Prucnal 003. This is going to be the Togami exhibit, 17 which is Exhibit 1007 in the IPR. 18 (Defendants' Exhibit 003 was marked.) 19 MS. RIOLO: I don't believe it's up for us. 20 MR. TONG: It is now introduced. 21 THE WITNESS: I clicked on it. It's -- oh, 22 it just came up. (Witness reviewing document.) 23 BY MR. TONG: 24 Q. All right. Do you recognize this as a copy 25 of the Togami reference? And if it -- if it expedites Page 32
1 A. Yes. So the date that I used for the 2 priority date was October 30th, 2023. 3 Q. Okay. Let's turn to paragraph 83 of your 4 report. 5 A. Okay. 6 Q. Could you please just take a moment to read 7 this, as well as Footnote 2? 8 A. Okay. 9 Q. Take a moment, please. 10 A. Okay. 11 Q. This paragraph says that you believe that the 12 '754 patent cannot claim -- cannot properly claim 13 priority to October 30th, 2023. Is the reasoning for 14 that sentence set forth in Footnote 2? 15 A. Yes. 16 Q. And that is because the Patent Owner added 17 substantial new matter to the specification of the '872 18 application through a preliminary amendment." Correct? 19 A. Correct. 20 Q. Could you direct me to the paragraph of your 21 report, if it exists, where you analyze whether or not 22 the claims of the '754 patent at issue find their 23 written descriptions support exclusively in the new 24 matter added to the specification of the seven -- 25 sorry, of the '872 application? Page 31	1 things, you can -- if you happen to have a copy of this 2 in your binder, you can look at your binder as well. 3 A. Yes, I recognize it as Togami. 4 Q. Okay. How long did you spend preparing for 5 this deposition? 6 A. I prepared for the last two days. 7 Q. Okay. And did you generally review your 8 report and the exhibits cited in your report as part of 9 that preparation? 10 A. Yes. 11 Q. Okay. Did you review the patent owners' 12 preliminary response filed in this IPR proceeding? 13 A. No, I didn't. 14 Q. Did you review the board's institution 15 decision as part of your preparation during this IPR 16 proceeding? 17 A. [Inaudible] of my review, I think I saw parts 18 of it, but didn't review it in its entirety. 19 Q. Okay. Fair enough. 20 Let's turn to Figure 2 in Togami. Please let 21 me know when you're there. 22 A. I am there. 23 Q. Okay. And this is an example of an SFP 24 module and an optical fiber cable; correct? 25 A. Yes. Page 33

1 Q. And the SFP module is on the left and the 2 optical fiber cable is on the right; correct? 3 A. Yes. 4 Q. I am going to introduce as Exhibit Prucnal 5 004 the Patent Owners' Preliminary Response. 6 (Defendants' Exhibit 004 was marked.) 7 MR. TONG: It should be shared now. 8 THE WITNESS: So should I take down Togami 9 off of my screen and put up the next document? 10 BY MR. TONG: 11 Q. Yes, please. Once you have this open, could 12 you please turn to page 8 of the document. 13 A. It's currently waiting to open. 14 Q. Okay. Just let me know when you're there. 15 A. The document is open. And did you say 16 page 8? 17 Q. Correct. 18 A. Okay. 19 Q. Do you see an annotated Figure 2 of Togami 20 shown on the top of page 8? 21 A. Yes. 22 Q. Are these labels of the electrical and 23 optical components, as well as the transceiver that 24 does conversion between electrical and optical? Do you 25 see those labels? Page 34	1 wanted to say in very general terms, the module is 2 plugging into something electrical on that side. 3 Q. And would it also be fair to say that the 4 optical fiber cable plugs into the right side, and the 5 right side would be the optical side of the pluggable 6 optical transceiver module? 7 MS. RIOLO: Object to form. 8 THE WITNESS: What I described on the -- on 9 the left side is the electrical connection between the 10 plug -- the pluggable module and whatever it's plugging 11 into. 12 And on the right side, we see that the fiber 13 cable, which is optical, is plugging into the module, 14 so that would be the point at which there's optical 15 input and optical output from the module. 16 BY MR. TONG: 17 Q. Thank you. 18 And at some point in between those two sides, 19 that's where the conversion between electrical and 20 optical occurs in the pluggable module; correct? 21 A. As a general statement, yes. 22 Q. And in your report, you rely on Togami for 23 its teaching of an SFP pluggable optical transceiver 24 module; correct? 25 A. Yes, I do. I do rely on Togami, and Togami Page 36
1 MS. RIOLO: Object to form. 2 THE WITNESS: I do see labels, yes. 3 BY MR. TONG: 4 Q. Do you agree that these labels are generally 5 fair and accurate in terms of describing which parts of 6 this figure show electrical and optical components? 7 MS. RIOLO: Objection. Outside the scope. 8 THE WITNESS: To answer that -- to tell you 9 whether these are correct, I would need to compare the 10 labels here with Togami's description of the module. 11 That is to say whether these are entirely accurate, I 12 would have to do that. 13 BY MR. TONG: 14 Q. Would you agree that the purpose -- the 15 primary purpose of a pluggable optical transceiver is 16 to convert between electrical and optical signals? 17 A. Well, that's one of the purposes of an 18 optical transceiver, to go from optical to electrical, 19 and to go from electrical to optical. But the 20 transceiver can also have other functions as well. 21 Q. Could you identify the -- which end of the 22 transceiver module shown in Figure 2 would be the 23 electrical side? 24 A. Well, generally, the left side of the module 25 has a -- an electrical connector on it, so if you Page 35	1 discloses a module that is a transceiver module. 2 Q. And not just a transceiver module, but a 3 pluggable optical transceiver module; correct? 4 A. Yes, it's a pluggable optical transceiver 5 module. 6 Q. Did you rely on any disclosure of Shraga for 7 a pluggable optical transceiver module? 8 A. I'd have to look at my report to verify that. 9 Q. Based -- but based on your two days of 10 preparation, you can't remember one way or the other as 11 we sit here right now? 12 A. Generally speaking, I did not rely on Shraga 13 to find the optical transceiver module. But before I 14 say absolutely yes or no, I would need to -- to be 15 accurate, probably look at my report. But generally 16 speaking, the answer would be yes. 17 MS. RIOLO: And I'm going to object to that 18 previous question as mischaracterizing prior testimony. 19 BY MR. TONG: 20 Q. Could you please take a moment to look at 21 your report and let me know where, if anywhere, you 22 rely on Shraga for teaching a pluggable optical 23 transceiver module? 24 A. (Witness reviewing document.) 25 I don't believe that I relied on Shraga for Page 37

1 the pluggable aspect of the transceiver module in my 2 report. 3 Q. Thank you. 4 Did you rely on Shruga for the module aspect 5 of the transceiver module in your report? 6 A. Would you say that again, please? 7 Q. Did you rely on Shruga for the module aspect 8 of the transceiver module in your report? 9 A. I don't think I opined separately about the 10 module aspects in the pluggable aspect of the module. 11 Q. Okay. Thank you. 12 I have introduced the next exhibit, if you 13 could please pull it up. This is a copy of the Shruga 14 referenced Exhibit 1005 in this IPR proceeding. It is 15 being introduced and marked as Prucnal 005. 16 (Defendants' Exhibit 005 was marked.) 17 MR. TONG: Please let me know when you have 18 this open. You may alternatively refer to a copy of 19 Shruga in your binder, if that is easier for you. 20 THE WITNESS: Thank you. It has opened. 21 BY MR. TONG: 22 Q. Okay. Please turn to Figure 1 of Shruga. 23 A. Okay. 24 Q. There is no optical transceiver module 25 pictured in Figure 1 of Shruga; correct? Page 38	1 A. Yes. 2 Q. And because it does that conversion, this ONT 3 would be an optical transceiver; correct? 4 A. I think -- I think we're making rather 5 general statements at this point. I would say that one 6 of the purposes of an optical transceiver is to convert 7 from optical to electrical and electrical to optical. 8 Q. Okay. Where, if anywhere, in Shruga does it 9 say that this ONT is a module? 10 A. I don't -- 11 MS. RIOLO: I was just going to say, Paul, 12 take your time looking at the reference. 13 MR. TONG: Object to coaching the witness. 14 THE WITNESS: I don't think that Shruga 15 refers to the ONT as a module. 16 BY MR. TONG: 17 Q. All right. Thank you. 18 We've been going for a little bit over an 19 hour. Do you want to take a break right now or do you 20 want to keep going for a bit? 21 A. I -- I think we could keep going for a little 22 bit, make a little more progress. 23 Q. Okay. 24 A. Unless you prefer to take a break. 25 Q. Let's go for another 15 minutes or so before Page 40
1 A. Shruga discloses an OLT and it also discloses 2 ONT -- ONTs, optical network terminals, as being 26A, 3 B, and C. So that -- so -- so each of those ONTs are 4 described by Shruga and those would be -- those would 5 be the ONTs. I haven't opined on whether the -- 6 whether I consider those to be modules or not. 7 Q. Thank you. 8 Do we share the understanding that the ONTs 9 are, in fact, optical transceivers? 10 A. Yes. In Shruga, these ONTs are transceivers. 11 Q. And they have an optical interface on the 12 left; correct? 13 A. Yes, they do. 14 Q. And the switch interface on the right labeled 15 32, that would be an electrical interface; correct? 16 A. In this particular case, the -- the switch, 17 in addition to doing switching, is interfaced to 18 something on the outside as indicated by the -- the 19 lines 32. So that would be -- that would be the -- the 20 side of this ONT that is communicating electrically 21 with the outside. 22 Q. And somewhere between the optical interface 23 on the left and the electrical interface on the right, 24 there would need to be conversion between optical and 25 electrical signals; correct? Page 39	1 we take a break, if that's all right with you. 2 A. That sounds good. 3 Q. As of the October 2003 assumed priority date, 4 or that general time frame, can you give an example of 5 any products that would be this ONT pictured in Shruga? 6 MS. RIOLO: Objection. Form. 7 THE WITNESS: I don't think I opined on any 8 specific products that would be ONT, but generally, 9 these would be ONTs for -- for a passive optical 10 network. And passive optical networks were deployed in 11 that time frame and ONTs were deployed in that time 12 frame. 13 BY MR. TONG: 14 Q. Can you give examples of companies that 15 deployed such products in 2003? 16 MS. RIOLO: Objection. Form. 17 THE WITNESS: I don't know the exact dates of 18 deployment, but examples might be some of the internet 19 service providers, so, for example, Verizon had a 20 product at that time; I believe AT&T had a product at 21 that time. 22 BY MR. TONG: 23 Q. Do you know the names of any of those 24 products? 25 A. So which product are you referring to? The Page 41

1 ONT itself? Or the -- the network as a whole? 2 Q. The product that would be the ONT. 3 A. I don't know. 4 Q. Have you ever seen that product? 5 A. So, again, what -- what product are you 6 specifically referring to? 7 Q. An AT&T or Verizon product that would be the 8 ONT in the network. 9 A. Yes. 10 Q. Could you describe what it looked like? 11 A. Sure. So, for example, the Verizon ONT at 12 that -- in that time frame -- and, again, I don't know 13 the exact dates. Generally, in the early 2000s, would 14 have been a -- would have been a -- the ONT would have 15 been a box. 16 And the box would have as its input an 17 optical fiber, and as its output an optical fiber, and 18 other inputs and outputs would be electrical signals 19 carried by -- I think at that time it was called a Cat5 20 cable. 21 Inside the box would be -- inside the box was 22 a board having a laser detector that would do 23 electrical to optical and optical to electrical 24 conversion. That's generally what the product looked 25 like. Page 42	1 order of 1 watt? 10? 100 watts? 2 MS. RIOLO: Objection. Speculation. 3 THE WITNESS: It would just be a guess. I -- 4 I don't know. 5 BY MR. TONG: 6 Q. Do you have an estimate of the magnitude of 7 power typically drawn by an ONT at that time period? 8 MS. RIOLO: Objection. Calling for 9 speculation. 10 THE WITNESS: I would just be guessing. I -- 11 I don't know. 12 BY MR. TONG: 13 Q. Do you still have Shraga in front of you? 14 A. Yes. 15 Q. In Figure 2 -- sorry, Figure 1, the left side 16 of Shraga would be considered the head end; correct? 17 A. So it's an -- it's an OLT at the head. 18 MR. TONG: Let's go ahead and take a short 19 break here before I introduce -- I change exhibits. 20 Can we take a five or ten-minute break? How long do 21 you need? 22 MR. WELCH: Why don't we do five minutes, if 23 that works for everybody? 24 MR. TONG: All right. 25 THE VIDEOGRAPHER: The time on the monitor is Page 44
1 Q. Thank you. 2 Was this a stand-alone box or was it 3 something that would typically plug into a server? 4 A. Well, the particular -- the particular one 5 that I described was a stand-alone box. 6 Q. Thank you. 7 Do you remember what color the box was? 8 A. Tan. 9 Q. It was colored tan. Okay. Yeah. 10 About how big was the box? 11 A. Maybe a foot by a foot and a half. 12 Q. Did that box have a power cable? 13 A. Yes. 14 Q. Would it be the type of power cable that 15 would plug into a socket in the wall? 16 A. That, I don't know. 17 Q. Do you have any idea how much power it used? 18 MS. RIOLO: Object. It's speculative. 19 THE WITNESS: Yeah, this is just one -- one 20 example that I happen to be familiar with. I know -- I 21 know it ran off of 120 volts. I don't know how many 22 amps of current it drew. 23 BY MR. TONG: 24 Q. Do you have an estimate of the order of 25 magnitude of power that it drew? Would it be in the Page 43	1 11:01 a.m. We are off the record. 2 (Whereupon a short recess was taken.) 3 THE VIDEOGRAPHER: The time on the monitor is 4 11:08 a.m. We are back on the record. 5 BY MR. TONG: 6 Q. Dr. Prucnal, did you speak with your 7 attorneys during the break? 8 A. No. 9 Q. Okay. I have uploaded the next exhibit, 10 Exhibit Prucnal 006. 11 (Defendants' Exhibit 006 was marked.) 12 BY MR. TONG: 13 Q. This is a copy of the Patent Trial and Appeal 14 Board Consolidated Trial Practice Guide November 2019. 15 I'm just going to read certain parts into the record. 16 Dr. Prucnal, you don't actually need to follow along. 17 A. My version actually hasn't come up yet. 18 Q. That's okay. 19 A. Okay. 20 Q. It's -- it is not important for you. 21 MS. RIOLO: Sorry. Sorry, Peter, are there 22 going to be any questions during this period? 23 MR. TONG: No, I'm just reading parts of it 24 into the record. On page 127 -- 25 MS. RIOLO: Sorry. For what purpose are we Page 45

1 reading this into the record? 2 MR. TONG: You'll -- you'll see very shortly. 3 Page 127 is ti- -- there's a section titled 4 "Examination and cross-examination outside the presence 5 of the Board." On page 128, paragraph three, it says, 6 "An objection must be stated concisely in a 7 non-argumentative and non-suggestive manner. Counsel 8 must not make objections or statements that suggest an 9 answer to a witness. Objections should be limited to a 10 single word or term. Examples of objections that would 11 be properly stated are: 'Objection, form'; 12 'Objection, hearsay'; 'Objection, relevance'; And 13 'Objection, foundation.' Examples of objections that 14 would not be proper are: 'Objection, I don't 15 understand the question'; 'Objection, vague'; 16 'Objection, take your time answering the question'; and 17 'Objection, look at the document before you answer.' 18 An objecting party must give a clear and concise 19 explanation of an objection if requested by the party 20 taking the testimony or the objection is waived." 21 So I would -- in view of the board's rules, I 22 would remind counsel not to object that anything is 23 vague, speculative, and I remind counsel not to coach 24 the witness by telling the witness to take his time 25 answering the question, or coach the witness by Page 46	1 Electrical labeled at the top? 2 A. Yes. 3 Q. Okay. Would you agree that these labels are 4 generally accurate in terms of identifying which parts 5 of this system are either electrical or optical? 6 A. I think that's generally a fair description 7 of that. 8 Q. Okay. And at the yellow highlighted optical 9 interface blocks, is that where any type of electrical 10 optical conversion would occur? 11 A. May I just have a look at the Shraga? 12 Q. Yes, absolutely. 13 A. I have a hard copy that I can do that. 14 Q. Please, go ahead. 15 A. Yes, the optical interface is the place where 16 the optical to electrical and electrical to optical 17 conversion would take place. 18 Q. In your expert report, for the grounds of 19 invalidity, you rely on a combination of Shraga and 20 Togami; correct? 21 A. I think I did. I haven't looked at my expert 22 report in a long time, but that's probably true. 23 Q. Did you review your expert report during your 24 two days of preparation for this deposition? 25 A. No. I reviewed my -- my declaration of the Page 48
1 instructing the witness to look at the document before 2 answering. I think these are clear from the rules and 3 they should be followed. 4 MR. WELCH: Counsel, we object to any 5 characterization that there's been any coaching of the 6 witness. And moving forward, we understand that you 7 have -- I don't know if you're lodging an objection 8 right now or you are just trying to put this in the 9 record, but we just wanted to reiterate that we 10 disagree with your characterization. 11 MR. TONG: Okay. Your statement is noted, 12 Matt. The record is what it is. 13 BY MR. TONG: 14 Q. All right. Let's turn back to what has been 15 marked as Prucnal Exhibit 4. Now, please let me know 16 when you have that document opened up in front of you. 17 A. Okay. It's open. 18 Q. Could you please turn to page 6 of this 19 document. 20 A. (Witness complies.) 21 Okay. 22 Q. Do you see at the top of page 6 there's an 23 annotated version of Shraga's Figure 1? 24 A. Yes. 25 Q. Do you see the words Electrical, Optical, and Page 47	1 IPR. 2 Q. I'm sorry. I meant to ask about your 3 declaration, so let me ask these questions again. In 4 your declaration in this IPR, you relied on a 5 combination of Shraga and Togami for your ground of 6 invalidity; correct? 7 A. Yes. 8 Q. And you did not rely solely on Shraga; 9 correct? 10 A. The ground was a combination of Shraga and 11 Togami, not solely Shraga. 12 Q. And you also do not have a 102 ground solely 13 relying on Togami; correct? 14 A. I'm not perfectly familiar with the legal 15 language. Could you tell me what 102 is, please? 16 Q. Yes. That is just that a single reference 17 anticipates the entire invention. 18 A. That would be correct. 19 Q. Okay. So I want to ask you what exactly -- 20 could you describe for the Board what your proposed 21 combination actually is? 22 A. Well, that's something I go to in detail in 23 my declaration when I -- when I -- when I described the 24 grounds. It's a combination of Shraga and Togami, as 25 we just discussed. Page 49

1 Q. Which of Shraga or Togami is your primary 2 reference that a PHOSITA would start with? 3 A. I'm not sure if I referred to it that way in 4 my declaration, but I did start with Shraga. 5 Q. Okay. So let's say a PHOSITA has the Shraga 6 reference, and they have this system shown in Figure 1 7 of Shraga. Okay? And that PHOSITA ends the Togami 8 reference. What would that PHOSITA do to Shraga's 9 system in order to modify it, in view of Togami? 10 MS. RIOLO: Objection. Form. 11 THE WITNESS: Well, Shraga describes the ONT 12 as we see here in Figure 1, and Togami describes an 13 optical transceiver module. And so the optical 14 transceiver, which is the ONT in Shraga, will be 15 combined with the pluggable module in Shraga -- I'm 16 sorry. In Togami. 17 BY MR. TONG: 18 Q. So my question is: How exactly would a 19 PHOSITA make that combination? And let me just provide 20 some context for my question. I -- I, frankly, don't 21 understand your expert report, and that's -- that's not 22 like a personal attack or anything. Please don't get 23 offended. 24 But I can't tell if what you're saying is a 25 PHOSITA would take Togami's pluggable and stick it, Page 50	1 A. So if we're looking at the Shraga ONT, it 2 would be everything but the switch, the switch which is 3 labeled as, I think, 64. Every other functionality 4 that's in that ONT would go into the Togami pluggable. 5 Q. Okay. Thank you for that clarification. 6 That helps clear up a lot of confusion. 7 Do you see the CLU block 40 -- I can't tell 8 if that's 45 or 46. 9 A. I think it's 46. 10 Q. Forty-six. In 2003, October, the -- the 11 assumed priority date, what physical chip would 12 typically be used to implement this CLU of Shraga? 13 MS. RIOLO: Objection. Form. 14 MR. TONG: What's the form objection? 15 MS. RIOLO: That's speculative, and you're 16 asking him to assume something. 17 THE WITNESS: CLU is a control and logic 18 unit. And this could be implemented in that time frame 19 in a variety of ways. So, for example, some type of a 20 programmable logic unit could be -- could be used for 21 this. 22 BY MR. TONG: 23 Q. Do you recall the names of any programmable 24 logic units available in October 2003? 25 A. There -- there are a number of types of chips Page 52
1 plug it somewhere into Shraga's system, or are you 2 saying, for example, that a PHOSITA would take 3 components from Shraga's system and miniaturize those 4 to put into Togami's pluggable, or is it something 5 else? 6 How exactly -- like, what is the step, the 7 first step, that a PHOSITA would take in order to make 8 this proposed combination that you are referencing in 9 your declaration? 10 MS. RIOLO: Objection. Form. 11 BY MR. TONG: 12 Q. I assume that's a compound question 13 objection, and if that's the case, please just answer 14 the last question that I raised. 15 A. I'm not sure that I can unravel it at this 16 point. Can you restate the last portion of the 17 question for me, please? 18 Q. Sure. What is the first step that a PHOSITA 19 would take in order to make your proposed combination 20 that you are referencing in your declaration? 21 A. The step would be to put the functionality 22 that's described in Shraga's ONT into the pluggable 23 module that Togami describes. 24 Q. And when you say "the functionality," which 25 blocks of that ONT are you referring to? Page 51	1 that could have been used. I don't recall the names of 2 them back then, but I know they existed. 3 Q. Do you recall the names of any chip, not 4 necessarily a programmable -- not necessarily a 5 programmable logic unit, that could have been used to 6 implement this CLU? 7 A. Sure. Probably we would start with some kind 8 of a field programmable -- field programmable logic Ray 9 FPGA. 10 Q. For example, one made by Xilinx? 11 A. Well, Xilinx makes them now. I just don't 12 recall who was manufacturing them at that time. 13 Q. Do you recall the name of any manufacturer at 14 that time who could have provided a suitable chip for 15 implementing the CLU of Shraga? 16 A. The Xilinx is one that we -- we currently use 17 a lot. I just -- I just don't know what was available 18 at that time. But I know they were available, and I 19 know we used them in our experiments. 20 Q. Would it have been Intel or Qualcomm or ... 21 A. No. I don't think so. 22 Q. All right. Let -- let's go back to your 23 proposal of taking functionality of Shraga and putting 24 it into Togami's SFP. 25 If we look at Shraga's optical interface Page 53

1 block, 52, where in Togami's SFP module would that be 2 moved to? 3 A. Well, that would be at the point closest to 4 where the fiber cable comes into the pluggable. 5 Q. And do you see the transmission framer and 6 receiver framer blocks 41 and 56 in Shraga? 7 A. Yes. 8 Q. And how would a PHOSITA move that 9 functionality from Shraga into Togami's SFP? 10 A. Well, I think -- I think Togami gives 11 guidance on that. So looking at Togami's pluggable, 12 looking at the engineering drawings of that, Togami 13 describes where these components would go. 14 Q. By engineering drawing, which figure are you 15 referring to of Togami? 16 A. I am referring to Figure 1. 17 Q. And where does Togami describe where the 18 transmission framer and receiver framer components 19 would go? 20 A. Well, among other things, Togami, in Column 1 21 around line 35, talks about the fact that in his 22 pluggable, there would be conversion from optical to 23 electrical and electrical to optical, but in addition 24 to that, he says that a number of protocols define the 25 conversion of electrical signals to optical. Page 54	1 to optical signals. 2 A. Well, now I think I'd have to understand what 3 you mean by a protocol for conversion of optical 4 signals to electrical or electrical to optical. 5 Q. In response to my question, where does Togami 6 describe where the transi- -- transmission framer and 7 receiver framer components would go, you had directed 8 me to Column 1, line 35, and you had started reading 9 from there, on line 37, it says "A number of protocols 10 define the conversion of electrical signals to optical 11 signals and the transmission of those optical, 12 including the ANSI Fibre Channel (FC) protocol." 13 So my question is: Do you consider the 14 transmission framer and receiver framer to be an 15 example of a protocol for the conversion of electrical 16 signals to optical signals as recited in Column 1, 17 line 38 of Togami? 18 A. So the conversion of electrical signals to 19 optical signals and vice versa is a -- is a physical 20 process. The preparation of data to be transmitted 21 when converted from electrical to optical, that, 22 depending upon the protocol that's used, may require 23 some kind of framing. 24 And that's all I'm saying, that Togami is 25 pointing out that -- that a protocol is used but it's Page 56
1 And so he's describing the functionality that 2 would include framing and other communication 3 protocols. 4 Then he goes on to describe Figure 1. And 5 that's around Column 5, line ten, thereabouts. And he 6 describes the -- the module in Figure 1 called 100. 7 And the -- the description is in there. He shows -- he 8 describes where the -- the electronics are and where 9 the optics are and indicates that those electronics can 10 be comprised of any kind of circuitry, depending upon 11 the application. 12 So those are a couple of places, put 13 together, that give me guidance as to where things are 14 placed in Togami's module. 15 Q. Okay. So are you saying that transmission 16 and -- framing and receiving framing is a protocol for 17 the conversion of electrical signals to optical 18 signals? 19 A. I'm saying that it's part of it. That -- 20 that given -- given the network protocol, that part of 21 the job that has to be done is the framing and 22 deframing of the data. 23 Q. Thank you. I agree with you it's part of a 24 network protocol. My question was: Whether or not it 25 was a protocol for the conversion of electrical signals Page 55	1 not for the actual physical conversion. It's in 2 conjunction with a physical conversion. I'm trying to 3 make that distinction. 4 Q. Let me ask it this way: In your 5 understanding, are transmission framing and receiving 6 framing a part of the ANSI Fibre Channel protocol? 7 MS. RIOLO: Objection. Asked and answered. 8 THE WITNESS: I don't recall specifically 9 what the ANSI Fibre Channel protocol called for. What 10 I'm referring to here is more general, that Tocami -- 11 Togami says that a number of protocols can define the 12 conversion of electrical signals to optical, meaning 13 putting the electrical signals in a particular format 14 before being transmitted. 15 He gives an example of the Fibre Channel 16 protocol, but I'm saying that in general -- in general, 17 the transmission protocol could involve some kind of 18 framing of the data before it's transmitted. 19 BY MR. TONG: 20 Q. And that would be a transmission protocol, 21 not part of the actual conversion of electrical and 22 optical signals; correct? 23 A. It depends how the terminology is used. I'm 24 saying that the actual conversion from electrical to 25 optical is a physical process. Page 57

1 That physical process might be done by a 2 laser, for example, but -- but in this -- this context, 3 sometimes it may be used more generally in talking 4 about the conversion of electrical data into optical 5 data, that some kind of formatting may be done as part 6 of a protocol. 7 So it's a more -- it's a more general 8 umbrella that would encompass not only the physical 9 conversion, but also the conditioning of the data 10 before it's sent. 11 Q. Moving on to the next blocks, labeled 48 and 12 50, the ingress FIFO and egress FIFO, is it your 13 understanding that FIFO refers to first in, first out? 14 A. Yes. 15 Q. And would it be fair to say that a FIFO is a 16 sort of buffer where you can store information and when 17 you need to retrieve information, the first piece of 18 information that went in is the first information that 19 goes out? 20 A. Yes, that's fair. 21 Q. And typically in an ONT, as shown by Shraga, 22 this would be some type of electrical digital hardware 23 that implements a FIFO? 24 A. Yes, that would be typical. 25 Q. Okay. And the transmission framing and Page 58	1 of the boundary between the optics and the electronics 2 and that would use things like analog optical time 3 delays, or switched optical time delays that were both 4 optical and analog. This might be used, for example, 5 for the purposes of time division multiple access. 6 Q. Would you consider that, the implementation 7 of TDMA, to be performed in the optical interface block 8 52 of Shraga or some other components? 9 A. It's hard to make a direct analogy between 10 what I just described and what we see here, but I would 11 say that it's most analogous to the -- the framing 12 part. 13 Q. Okay. But that would -- strike that. 14 Can you identify an example of an electrical 15 digital hardware device that a PHOSITA could have used 16 in October 2023 to implement the framer FIFO and CLU in 17 Togami's SFP? 18 A. Well, I think -- I think ultimately, one 19 would implement these in some kind of an ASIC, but as I 20 mentioned earlier, I think initially, one would 21 probably implement them with an FPGA. 22 Q. And the memory block in Shraga, do you see 23 that? 24 A. Yes. 25 Q. How would that be implemented in Togami's Page 60
1 receiving framer blocks, those would also typically be 2 implemented by electrical digital hardware; correct? 3 A. That would be typical, yes. 4 Q. And the CLU 46, that would also typically be 5 implemented by electrical digital hardware; correct? 6 A. Yes. That's correct. 7 Q. In all your experience, have you ever 8 implemented a framer as an -- as electrical analog 9 hardware? 10 A. I don't think I have. 11 Q. And have you, in all your experience, ever 12 implemented a FIFO as electrical analog hardware in an 13 ONT? 14 A. No. 15 Q. And in all your experience, have you ever 16 implemented a CLU as analog hardware in an ONT? 17 A. No. 18 Q. And in all your experience, have you ever 19 implemented any of the framer FIFO or CLU as optical 20 hardware in an ONT? 21 A. That might require some more explanation, but 22 yes, I have. 23 Q. Please explain. 24 A. So early on, I was doing research that 25 related to various multiplexing techniques, processing Page 59	1 SFP? 2 A. That would be implemented with some kind of 3 electronic memory. And, again, this could be in 4 conjunction with an ASIC or in conjunction with an 5 FPGA, a memory chip. 6 Q. Okay. Can you identify an example memory 7 chip from October 2003 that could be used in Togami's 8 SFP? 9 A. I haven't opined on that and haven't 10 investigated. I don't recall specifically ones that 11 were available then, but I know they were available. 12 Q. So in your hypothetical proposed combination, 13 the only thing left in Shraga's ONT would be the Switch 14 64; correct? 15 A. The only thing that we haven't discussed so 16 far, is that what you mean? 17 Q. No. I mean after making your proposed 18 modification of the system, which you previously 19 described as taking everything but the switch and 20 moving it into Togami's pluggable, the only thing left 21 in the ONT would be, in fact, the switch; correct? 22 A. Yes. 23 Q. Okay. All right. I'm going to go ahead and 24 introduce the next exhibit. 25 ///// Page 61

1 (Defendants' Exhibit 007 was marked.) 2 BY MR. TONG: 3 Q. This is going to be a copy of the '754 4 patent, Exhibit 1001 in the IPR proceeding. You're 5 going to have -- I'm going to take a minute to mark it 6 up and introduce it as an exhibit. 7 All right. A copy of the '754 patent is 8 being introduced as Prucnal 007. Please let me know 9 when you get a copy of it, either online or in your -- 10 in your binder. 11 A. I already have it in my binder. It hasn't 12 yet appeared online yet, though. 13 Q. Well, I want to make sure counsel has an 14 opportunity to download it. 15 A. It just popped up. 16 Q. Okay. And if you could turn toward the end 17 where Claim 1 begins in Column 16. My next set of 18 questions is generally going to involve the plain 19 language in Shraga, so if you have both those 20 references handy, it may facilitate the next part of 21 the questioning. 22 Do you see where Claim 1 begins? 23 A. Yes. 24 Q. And it begins a network client optical 25 transceiver module. Page 62	1 on the optical distribution fabric in 52 in Figure 1 of 2 Shraga; correct? 3 A. That's correct. 4 Q. Okay. And if we continue reading Claim 1, it 5 says, quote, For coupling the network client optical 6 transceiver module to -- sorry. I'm going to restart 7 the quote. "For coupling the network client optical 8 transceiver module over one or more optical fibers." 9 Did I read that correctly? 10 A. Yes. 11 Q. And you indicate where Shraga, in Figure 1, 12 there would be an example of the claimed optical fiber? 13 A. It's Figure 1 of Shraga and there are optical 14 fibers that connect the ONT to the optical distribution 15 fabric. I don't know that those have numbered labels 16 on them, but they -- they are lines with arrows -- 17 with -- with arrows on both sides of them -- 18 Q. Thank you. 19 A. -- according to the optical distribution 20 fabric. I would add that there's also optical fibers 21 on the other side of the optical distribution fabric, 22 indicated by lines with arrows on both sides. 23 Q. Okay. Thank you. 24 And Claim 1 of the '754 continues, quote, To 25 the head end of the passive optical network. Page 64
1 Do you see those words? 2 A. Yes. 3 Q. And in your declaration, you rely on Togami 4 alone for teaching an optical transceiver module; 5 correct? 6 A. I don't think that's the way I would say it, 7 no. 8 Q. How would you say it? 9 A. I rely on Shraga for the functionality of the 10 optical transceiver, and I rely on Togami for the 11 pluggable aspects, the pluggable module itself. 12 Q. Thank you. 13 These -- the words that we've read so far, a 14 network client optical transceiver module, so far, no 15 functionality is described yet; right? 16 A. Not in what we've read so far. 17 Q. Okay. So far there's nothing to rely on 18 Shraga for; correct? 19 A. Not so far. 20 Q. Okay. Then Claim 1 continues with the words, 21 quote, For a passive optical network having one or more 22 passive optical splitters. 23 You see those words? 24 A. Yes. 25 Q. And for that part of Claim 1, you're relying Page 63	1 We've established earlier that the left side 2 of Shraga Figure 1 would be considered the head end; 3 correct? 4 A. That's right. 5 Q. And then the claim continues, "and the 6 network client optical transceiver module having a 7 pluggable form factor." 8 Did I read that correctly? 9 A. Yes. 10 Q. And as we discussed, you are relying on 11 exclusively Togami for teaching that pluggable form 12 factor; correct? 13 A. In terms of the combination, Togami has the 14 pluggable form factor. That's correct. 15 Q. And as far as the optical transceiver, you 16 consider Shraga's ONT, aside from a switch, to be 17 performing -- to be the equivalent of an optical 18 transceiver that could be put into Togami's SFP; 19 correct? 20 A. Yes. All of the functionality in Shraga 21 that's inside the ONT, with the exception of the 22 switch, would be the transceiver that's going into the 23 Togami pluggable device. 24 Q. And then Claim 1 continues, "and configured 25 to removably couple to an optical module port of a Page 65

1 switch or router." 2 Did I read that correctly? 3 A. Yes. 4 Q. What would be the switch or router that is 5 taught by either of these references? 6 A. Well, that's -- that's described in some 7 detail in my report. 8 Q. Is that Switch 64 of Figure 1 of Shraga? 9 A. That's the switch. Yes, 64 is the switch. 10 Q. Could you direct me to the part of Shraga 11 that says that that switch has an optical module port? 12 A. Well, again, I have to go to my report in the 13 area where I talk this switch and I talk about this 14 switch being either inside the boundary of this ONT or 15 outside the boundary of this ONT as a design choice. 16 So that's -- I don't think that's described explicitly 17 in Shraga, but do I address it in my report. 18 Q. Could you point me to the paragraph of your 19 report that addresses this? 20 A. Sure. I'll need a moment to find it. 21 Q. And we're saying report. I think we both 22 mean declaration. 23 A. Thank you. Yeah. Not expert report, but 24 declaration. 25 So this discussion takes place starting on Page 66	1 considered to be an optical module port? 2 A. No, no. In fact, I think what we have here 3 is the FIFO having an electrical interface port that's 4 coupled to the optical module port of the switch. So 5 the optical module port would be on the other side, on 6 the switch side. 7 Q. Okay. And -- 8 A. And what I was -- what I was saying before 9 and what I was looking for is actually on the bottom of 10 this paragraph. 11 So first I say that the interface between 12 the -- between the trans- -- transceiver, as I've 13 defined it, and the switch occurs at that point between 14 the FIFO and the switch. There's no explicit separate 15 port shown there, but that's where the -- that's where 16 the port would be. 17 But then I say at the bottom of paragraph 141 18 that whether that switch be included on the inside of 19 this ONT module or on the outside is a design choice, 20 which is to say that one could just have that switch 21 outside equally well as inside. If it were outside, 22 then it would have a port to connect to the FIFO. 23 Q. In your answer, you referred to "the bottom 24 of this paragraph." What paragraph number are you 25 referring to? Page 68
1 page 66 and going through -- excuse me for a second. 2 No. It's -- it starts on page 71, Claim 1, Section D, 3 that's where there's the requirement of the electrical 4 interface port coupled for electrical coupling into the 5 optical module port of the switch or router for 6 communicating with the switch or router. 7 Q. So given that this is not described 8 explicitly in Shraga, what modification of Shraga are 9 you proposing, such that there would be an optical 10 module port in the switch? 11 A. Well, I -- I believe that I -- you know, as I 12 said, this -- this whole section talks about it, and I 13 address this in a couple of ways. And first of all, in 14 paragraph 141, I indicate that Shraga teaches that the 15 FIFO, both ingress and egress, is electrically coupled 16 to the inputs and outputs on the left side of the 17 switch. 18 So that's one place which is shown explicitly 19 in Shraga where the transceiver, as I've defined it, 20 is -- is connected to the switch as shown by 64. 21 Q. Okay. Thank you. 22 The connection between those FIFOs and the 23 switch, that's an electrical connection; correct? 24 A. Yes. Yes. 25 Q. Are the FIFO blocks themselves typically Page 67	1 A. 141, at the bottom of page 72. 2 Q. So 141 begins, "Additionally, Shraga teaches 3 that the ingress and egress FIFOs are electrically 4 coupled to the inputs and outputs on the left side of a 5 switch (shown in blue in Fig. 1 above), which is 6 illustrated explicitly in Figure 1." Then you have a 7 citation. "Shraga also teaches that the switch 8 operates according to, quote, controlling signals 9 received from [the] CLU, end quote." Citation. 10 MS. RIOLO: Objection. No question. 11 MR. TONG: I haven't asked a question yet. 12 BY MR. TONG: 13 Q. Then it continues, "A PHOSITA would have 14 understood that, for the switch in Shraga to operate 15 according to controlling signals from the CLU, it must 16 have been electrically coupled to the switch." 17 Then it says, "A PHOSITA also would have 18 understood that the inclusion of a switch within the 19 ONT/ONU module itself, as shown in Shraga, is a design 20 choice and that the switch could have been connected to 21 the ONT/ONU internally or externally." 22 Let me ask you about last sentence. Are you 23 proposing that the switch could be moved outside of 24 Shraga's ONT? 25 A. Yes. Page 69

1 Q. And so in this hypothetical combination that 2 you're proposing, everything but the switch would be 3 moved into Togami's SFP pluggable optical transceiver 4 module, and the switch would also no longer be a part 5 of this ONT, so really, there's nothing left of the 6 ONT; correct? 7 A. I -- I think what you said is correct, that 8 everything but the switch goes into the Togami 9 pluggable. The switch, whether it's inside or outside, 10 would be design choice, but the switch could be 11 outside. That's -- that's one proposal. 12 I -- I also should mention, since we're -- 13 we're only looking at the beginning of this section, I 14 believe that later in this section, I also say that 15 depending upon the functionality of the switch, 16 there -- there could typically be another switch 17 outside of this acting as a network switch of some 18 kind. But what you said is correct. 19 Q. Why, in paragraph 141, did you say that, "A 20 PHOSITA would have understood that, for the switch in 21 Shraga to operate according to controlling signals from 22 the CLU, it must have been electrically coupled to the 23 switch"? 24 A. Well, only because the -- the claim that this 25 is -- this is -- is related to requires that the Page 70	1 A. My understanding is that the optical module 2 port -- if we -- if we take the switch shown here in 3 Figure 1, the optical module port is the port into 4 which you plug the module. 5 So let's say the module is my left hand and 6 the switch is my right -- this is the optical module, 7 and -- my left hand, and the switch can plug the -- the 8 optical module would plug into the switch, and the 9 thing that it plugs into is called the -- the optical 10 module port. 11 So looking at Figure 1, the optical module 12 port would be on the left side of 84. And sure as is 13 shown, there's a direct connection between the FIFO and 14 the switch, but if the switch were on the outside of 15 the box, there would have to be a port for the 16 pluggable to plug into. That would be the optical 17 module port. 18 Q. Okay. Thank you. 19 Turning back to the '754 patent, I'm going to 20 continue to read from where we left off in the claim. 21 It says, quote, The network client optical transceiver 22 module comprising. 23 Do you see that? 24 A. Yes. 25 Q. And then do you see after that, there are Page 72
1 electrical network interface port must be electrically 2 coupled to the control module and for electrically 3 coupling into the optical module portion of the switch. 4 In other words, the control module has to be 5 electrically coupled to the switch. And the logic that 6 I'm presenting is that Shraga teaches that the switch 7 is controlled by the CLU, and therefore, the CLU must 8 be electrically coupled to the switch. 9 Q. What types of controlling operations does the 10 CLU perform on the switch? 11 A. I have to look at Shraga for the details on 12 that. One example of this is in Shraga, at the bottom 13 of Column 7, top of Column 8, which I can just -- I can 14 just paraphrase. So it says that the -- the ONT 15 comprises a switch which switches between coupled 16 services to the OLT, according to controlling signals 17 received from the CLU. 18 So there can be different services coupled to 19 the OL- -- OLT through the switch, and the CLU can 20 control the state of the switch to determine which of 21 those services are switched to the -- the data ingress 22 of the FIFO. 23 Q. And going back to where the optical module 24 port would be, are you saying that it would be on the 25 left side of these switches or on the right side? Page 71	1 one, two, three, four par- -- four paragraphs with 2 claim elements? 3 A. Yes, and there's sort of a -- a paragraph at 4 the end that I think is intended as well. 5 Q. Correct. And the -- the four paragraphs that 6 I'm referring to, one begins, "An optical port"; the 7 next one begins, "A bi-directional optical interface 8 block"; next one begins, "A control module"; and the 9 next one begins, "An electrical network interface 10 port." 11 Do you see those four paragraphs? 12 A. Yes. 13 Q. And is it your understanding that each of 14 these components must be in the network client optical 15 transceiver module? 16 A. Yes. 17 Q. So let's look at the first one, which is, 18 quote, An optical port configured to optically couple 19 to one or more optical fibers of the passive optical 20 network having one or more passive optical splitters. 21 Did I read that correctly? 22 A. Yes. 23 Q. And if we turn to page 62 of your 24 declaration, this is where you indicate that Togami's 25 SFP module has the optical port in yellow that is Page 73

1 configured to connect to a optical fiber in red; 2 correct? 3 A. Yes. 4 Q. And if we go to the page above that, page 61 5 in your declaration, you mark up with red circles a 6 connection to the optical interface of the ONTs. Why 7 did you mark that up? 8 A. That shows the position of the optical port 9 in Shruga. It's the place where the -- there's an 10 optical distribution fabric with a fiber, which is the 11 bidirectional arrow, that goes to the optical 12 interface. And so that fiber has to be connected to 13 the optical interface, and that point of connection 14 that I've circled is the optical port. 15 Q. Okay. And that's an optical port of an ONT; 16 correct? 17 A. Yes. 18 Q. And that is not an optical port of an optical 19 transceiver module because Shruga does not explicitly 20 teach optical transceiver modules; correct? 21 A. Shruga is teaching ONTs, and the ONT has an 22 input port, which I've circled. Shruga does not 23 explicitly describe this as a module, but it is the 24 pluggable module in Togami that -- 25 Q. I just want to make -- sorry. Page 74	1 Q. So I -- I get that. And I just want to 2 confirm that you're relying on Shruga for an optical 3 port of an ONT, not for an optical port of a pluggable 4 optical transceiver module; correct? 5 MS. RIOLO: Objection. Asked and answered. 6 THE WITNESS: I would agree that I'm relying 7 on Shruga for the optical port of the ONT. But I would 8 add, when I look at this Shruga ONT in satisfying the 9 claim, it's in combination with Togami, that has the 10 physical module and the physical optical port. So 11 you're correct that the optical port that I'm looking 12 at in Shruga is shown on an ONT and not an actual 13 module. 14 BY MR. TONG: 15 Q. Okay. Now let me ask you about your 16 combination that we're discussing. So in your 17 combination, are you proposing that what was marked 18 in -- circled in red in Shruga be moved to the part of 19 Togami's SFP that is highlighted in yellow? 20 A. Oh, I don't think of it as being moved to 21 there. I think of it as being that. I mean, I know 22 that when Shruga shows an ONT, that there's necessarily 23 a physical connection between the optical fiber coming 24 in and the optical interface. 25 So I'm really identifying -- not moving it, Page 76
1 A. I was just going to say that explicitly shows 2 where the -- where the port is in the module itself. 3 Q. Thank you. 4 I just want to make clear that you're relying 5 on Togami for an optical port of an optical transceiver 6 module, and you're not relying on Shruga for an optical 7 port of an optical transceiver module; correct? 8 A. No. But what I'm trying to say is that this 9 is the combination, because Shruga has an ONT with an 10 optical port and the ONT is in Togami's pluggable 11 module. 12 Q. I'm sorry. Your answer was a little 13 confusing. I'm going to ask you about the combination 14 next; so I'll give you a chance to get to that. 15 A. Okay. 16 Q. But was I correct in understanding your 17 report to rely on just Togami for the optical port of 18 the optical transceiver module, and not Shruga, because 19 Shruga does not teach an optical transceiver module? 20 A. I think I see the distinction you're making, 21 but -- but I want to repeat that I am relying on Shruga 22 for an optical port of the ONT. And it may not be 23 explicitly described as a -- as a module or a pluggable 24 module, but I -- I do have where the optical port of 25 the ONT is. And Togami gives me the rest. Page 75	1 but identifying what that is when I look at the 2 physical pluggable in Togami. And that would be the 3 area that's highlighted in -- generally highlighted in 4 yellow. 5 Q. Okay. Thank you. 6 So you're saying, kind of, that these are 7 corresponding components, not that you're -- you're 8 moving something from one to the other? 9 A. I think that would be a better way of saying 10 it. 11 Q. I'm going to read the next claim element from 12 the '754 patent. Can you please follow along. It 13 says, "A bi-directional optical interface block 14 optically coupled to the optical port and configured to 15 perform optical-to-electrical and electrical-to-optical 16 signal conversion." 17 Did I get that correct? 18 A. Yes. 19 Q. And if we turn to page 64 of your report, you 20 have highlighted the optical interface block 52 of 21 Shruga. 22 A. Correct. 23 Q. And that is what you rely on as the part that 24 performs optical to electrical and electrical to 25 optical signal conversion; correct? Page 77

1 A. That's correct. 2 Q. And it's your opinion that Togami's SFP also 3 can perform optical to electrical and electrical to 4 optical signal conversion; correct? 5 A. That's correct. 6 Q. Could we please turn to the patent owner 7 preliminary response that we had looked at earlier. 8 Let me know when you're at page 8, please. 9 A. Okay. 10 Q. So what we just discussed, that -- that could 11 be represented by the words "electrical/optic 12 conversion" that's labeled on that SFP module; correct? 13 A. So by what we just discussed, do you mean the 14 optical in-place -- interface block? 15 Q. No. I mean the performance of optical to 16 electrical and electrical to optical signal conversion. 17 It happens somewhere in that SFP module; correct? 18 A. It does. And it's generally inside of it. 19 The way it's labeled here in the patent owner's 20 response, it sort of encompasses the whole volume of 21 the pluggable, but it happens somewhere in there. 22 Q. Okay. Is there a place that it more 23 specifically happens? 24 A. Yes. I believe that's described in Togami. 25 So Togami discusses a module that contains a laser Page 78	1 understanding of SFP modules, where would be the 2 typical location of a laser in Togami's Figure 1? 3 A. Yeah, so in Togami's Figure 1, it's going to 4 be in the vicinity of -- on Figure 1, in the vicinity 5 of 113, so -- so there are two labels for 113, one 6 for -- presumably for input and one for output. That's 7 where the fiber connector comes in. And so directly 8 adjacent to that, directly to the left of that, would 9 be where it would be located. 10 Q. Okay. And then on the receiver side that 11 receives an optical signal, what's the component that 12 typically performs optical to electrical conversion? 13 (Clarification by the reporter.) 14 THE WITNESS: Photodetector. 15 BY MR. TONG: 16 Q. And where would that photodetector be? 17 A. Yes, again, so I'm pointing to where the 18 receptacle is, roughly where 113 is pointing. And 19 there are two ports there, one for the output and one 20 for the input. And the one that's for the input would 21 have a photodetector and associated components directly 22 adjacent to where the fiber comes in. 23 Q. And at the end labeled 105, it looks like 24 there are six electrical pins; correct? 25 A. Yes. Page 80
1 transmitter circuit and an optical receiver, and 2 they're doing the electrical to optical and optical to 3 electrical conversion. 4 I believe that Togami also points to it in -- 5 in that engineering drawing in Figure 1. That would be 6 the -- the version of this Figure 2 that you see where 7 it's -- where it's opened up. The Figure 2 that you 8 show has a cover on it; so you don't see what's inside. 9 But I think Togami is more explicit in showing where 10 those things exist. 11 Q. With reference to the Figure 1 of Togami, 12 could you walk us through the important components that 13 perform electrical to optical and optical to electrical 14 signal conversion? 15 A. Sure. I'll need to go back to Togami to 16 remember how he labels those things. 17 Q. Of course. 18 A. Well, Togami talks in Column 1, between lines 19 30 and 45, about a laser transmitter circuit and also 20 an optical receiver for doing the electrical to optical 21 and optical to electrical conversion. And I know that 22 he describes it generally as being toward the -- toward 23 the end where the -- the optical fiber ports are. And 24 I'm just not able to find where it's labeled. 25 Q. That's okay. Based on your general Page 79	1 Q. And that's in compliance with the SFP spec; 2 correct? 3 A. I assume so. 4 MR. TONG: Okay. I'm going to introduce as 5 the next exhibit the SFP MSA agreement, but before I do 6 so, do you want to take a lunch break now, or do you 7 want to take one later? Because we've been going for 8 quite a bit. 9 THE WITNESS: Yeah, I -- I would prefer -- 10 how long have we -- have we been going? 11 MS. RIOLO: About an hour 20. 12 THE WITNESS: Yeah, I would prefer to just 13 take, like, a five-minute break now and then continue 14 for a little while, if that's okay with you. Is there 15 anything else going on? 16 MR. TONG: Let's do a ten-minute break, if 17 that's okay with everyone. 18 THE VIDEOGRAPHER: The time on the monitor is 19 12:34 p.m. We are off the record. 20 (Whereupon a short recess was taken.) 21 THE VIDEOGRAPHER: The time on the monitor is 22 12:45 p.m. We are back on the record. 23 BY MR. TONG: 24 Q. Dr. Prucnal, did you speak with counsel 25 during the break? Page 81

1 A. No. 2 Q. I have introduced as Prucnal Exhibit 8 the 3 SFP MSA, which is in this IPR proceeding as 4 Exhibit 1016. 5 (Defendants' Exhibit 008 was marked.) 6 BY MR. TONG: 7 Q. And could you please pull up a copy of it, 8 either online or in your binder? 9 A. Okay. It just came up. 10 Q. Yeah. And very generally, could you tell us 11 what this document is? 12 A. Well, very generally, it is a -- I believe 13 it's called a multi-source agreement, MSA, which was an 14 agreement between a number of manufacturers in this 15 time frame, generally the early 2000s, I believe, as to 16 what the specifications of the pluggables would be. 17 Q. Yeah. And so this document set -- sets forth 18 some of the mechanical and electrical specifications of 19 SFP modules; correct? 20 A. Yes. 21 Q. If we turn to page 6. So pages 6 and -- 6 22 through 8 set forth the mechanical specifications for 23 the industry standard SFP module at the time; correct? 24 MS. RIOLO: Sorry, Peter. Do you mean page 6 25 that's labeled page 6, or page 6 of the PDF generally? Page 82	1 take it to be just that. 2 Q. Okay. Do you recognize the pattern of 3 contact shown on pages 9 and 10 to, in fact, be the 4 electrical contacts in an SFP transceiver module? 5 A. I -- I haven't opined on that, and I -- and I 6 don't know for certain. It does -- it does seem to be 7 describing the contacts between the printed circuit 8 board and the electrical connector, which I don't take 9 to be the same as the outboard connector necessarily. 10 Q. Given the -- if we look at page 10, we see 11 views from the top of the board and the bottom of the 12 board. Would it be safe to assume, then, that the six 13 contacts shown in Togami are a somewhat oversimplified 14 version of what it would -- of the actual standard? 15 MS. RIOLO: Objection. Form. 16 THE WITNESS: As -- as I said, it could be 17 that, but I don't know for sure without looking more 18 broadly at this document, because -- the reason I can't 19 answer yes to that is that this section is talking 20 about the connection between the printed circuit board 21 and the connector, and -- and so the printed circuit 22 board itself may have different connections than the -- 23 the output connector itself, and I'm not sure which of 24 these connections we're looking at here. Actually, it 25 says top of board and bottom of board, so we seem to be Page 84
1 MR. TONG: Page 6 as numbered on the bottom 2 right-hand corner of this document. 3 MS. RIOLO: So does that begin with "Appendix 4 A. Mechanical Interface"? I'm sorry. There's just two 5 page numbers at the bottom of the exhibit. 6 MR. TONG: Yes, that begins with "Appendix A. 7 Mechanical Interface." 8 MS. RIOLO: Okay. 9 THE WITNESS: So what I see here are SFP 10 transceiver package dimensions, a drawing of the SFP 11 transceiver, and a continued drawing of the SF -- SFP 12 transceiver from another perspective on pages 6, 7, and 13 8. 14 BY MR. TONG: 15 Q. And those drawings show the industry standard 16 dimensions for an SFP transceiver; correct? 17 A. They are the standard to the extent that the 18 multi-source agreement defines the standard dimensions. 19 Q. Okay. And then if we continue on to page -- 20 pages 9 and 10, this sets forth the standard for the 21 electrical contacts of an SFP transceiver; correct? 22 A. I think I'd have to look -- look at this 23 document more broadly. I haven't seen it in a long 24 time. The -- page 9 describes the mating of the SFP 25 transceiver PCB to the SFP electrical connector, so I Page 83	1 looking at the printed circuit board connections. 2 BY MR. TONG: 3 Q. Can you turn to page 20? 4 A. Okay. 5 Q. Are these pin definitions that are shown, 6 would any of these map to what was shown in Togami? 7 A. Again, to -- to give you a -- an accurate 8 answer, I really need to reread this MSA. I -- I do 9 see six pins on Togami on the outboard connector, as 10 you've said. 11 This MSA agreement is talking about a 12 particular electrical interface of the SFP that it says 13 is specific to gigabit -- data count -- datacom 14 applications, such as Fibre Channel and Gigabit 15 Ethernet, and that there would be different pin 16 definitions for solid ATM, for example. 17 So -- so first off, I'm not sure exactly what 18 I'm looking at in this diagram, but it is specific to 19 the -- the gigabit applications, rather than more 20 generally, pin definitions could differ. 21 Q. Okay. Did you review this during your two 22 days of depo prep? 23 A. No. 24 Q. Okay. Could you turn to page 22, paragraph 25 eight. Page 85

1 A. Okay. 2 Q. So the second -- well, I'll -- I'll go ahead 3 and read it. It says, "The VccR and VccT are the 4 receiver and transmitter power supplies. They are 5 defined as 3.3V ±5% at the SFP connector pin. Maximum 6 supply current is 300 mA." 7 So based on this definition, if you wanted to 8 calculate the maximum wattage, would you use the 9 equation P=IV to multiply the 3.3 volts by 300 mA? 10 A. That would be correct. 11 Q. And so we can set this document aside and 12 we'll turn back to the '754 patent. I'm going to 13 continue reading the claim element. Let me know when 14 you're there so you can follow along. 15 A. Okay. 16 Q. The next claim element is, quote, A control 17 module electrically coupled to the bi-directional 18 optical interface block, and then it continues on from 19 there. 20 For this claim control module in your 21 declaration, you're relying on Shraga's CLU for this; 22 correct? 23 A. Yes. 24 Q. And the relevant section of your report from 25 paragraphs 133 to paragraph 138, this does not rely on Page 86	1 the duties of the CLU of Shraga? 2 A. I don't -- I don't know if I would say 3 "modified," but it would be carrying out the duties of 4 the CLU. 5 Q. Okay. As of 2003, do you know of any 6 electrical component that would be represented by 7 numeral 103 of Togami that could carry out such CLU 8 duties? 9 MS. RIOLO: Objection. Form. 10 THE WITNESS: Well, as I said before, it 11 could be an FPGA or it could be an ASIC. 12 BY MR. TONG: 13 Q. Okay. Do you know anyone who made such an 14 FPGA or an ASIC in 2003? 15 A. I don't know who the manufacturers were. 16 MR. TONG: And for the reporter, that's 17 A-S-I-C. 18 BY MR. TONG: 19 Q. I want to move on to -- hold on. So if we 20 turn back to Shraga for a moment and the figure that 21 Shraga shows, turning to Figure 1, if we look at the 22 ONTs and how they include a CLU, in your proposed 23 combination system, would Shraga's ONT still have a 24 CLU? 25 A. The ONT would still have all of the digital Page 88
1 Togami for separately teaching a similar CLU or control 2 module; correct? 3 A. I don't -- I don't mention Togami in this 4 section, other than the fact that it is Shraga, in 5 combination with Togami, that discusses the entire -- 6 entire element in -- in paragraph 133. 7 Q. Thank you. 8 So to clarify what you mean by that, you're 9 relying on just Shraga for the CLU, and the proposed 10 combination is that the CLU would be taken from 11 Shraga's system and put into the pluggable optical 12 transceiver module taught by Togami. Is -- is that the 13 correct interpretation of that combination? 14 MS. RIOLO: Objection. Form. 15 THE WITNESS: So it's not -- it's not exactly 16 that. Togami -- Togami gives a description of what's 17 inside the physical module that he shows in Figure 1. 18 And he describes circuitry, which is labeled as 103, 19 which he says can have a number of functions. So I'm 20 not just taking the CLU out of Shraga and putting it 21 into Togami, but Togami has a place for it, if you 22 will. 23 BY MR. TONG: 24 Q. So to be clear, you're saying that the 25 circuitry 103 of Togami would be modified to perform Page 87	1 electronic components that we discussed, but they could 2 be incorporated into a single chip or multiple chips, 3 but it would still have the CLU in some form, although 4 it might be part of a larger circuit. 5 Q. So your proposed combination then is not to 6 move the components out of Shraga into Togami's 7 pluggable, but it's -- would it be more accurate to say 8 that you would be duplicating these components in 9 Togami's pluggable? 10 MS. RIOLO: Objection. Calls for speculation 11 testimony. 12 THE WITNESS: Could you explain what you mean 13 by "duplicating" a little more? 14 BY MR. TONG: 15 Q. Yeah. So, for example, if we look at the 16 CLU, are you proposing that at the end of the day when 17 a PHOSITA has made the modifications and combinations 18 that are supposedly obvious, that they would end up 19 with a -- a pluggable -- a Togami pluggable module on 20 one hand with chips that perform the CLU duties as 21 described in Shraga, and on the other hand, they would 22 also have a pawn system shown in Figure 1 of Shraga 23 where the ONTs also have a CLU that also performs CLU 24 duties? 25 MS. RIOLO: Objection. Form. Page 89

1 THE WITNESS: I -- I don't think that's what 2 I'm saying. I'm sorry. I'm not quite following your 3 description of this. What -- what I'm saying -- maybe 4 I can explain what I'm saying. 5 BY MR. TONG: 6 Q. Please. 7 A. Because I think what you're asking -- I'm 8 saying that Shraga has an ONT with certain 9 functionalities in it, and those -- those -- those 10 functionalities of that ONT, of that transceiver, would 11 be incorporated into the pluggable described by Togami 12 in which he describes the physical pluggable, shows the 13 circuit board, shows it where some of the chips would 14 be located. 15 And I'm saying that some of the functions 16 that we've been talking about would be implemented with 17 digital electronics on one or more chips. Might be on 18 the same chip, might be on multiple chips. There's 19 different ways of implementing it. 20 Q. So -- 21 A. So that's what I'm saying, and I'm just 22 wondering what you're -- I don't understand your 23 question. 24 Q. Yeah. My question, just for context, I mean, 25 they're supposed to be some type of combination that Page 90	1 functionality in Togami. Or are you using "implement" 2 in a different sense? 3 A. I think I'm using in -- either way. Which is 4 that you could take Shraga, possibly, as it is. Not 5 all of the circuitry is shown, so I couldn't 6 necessarily, as -- as you say, plop it in, because it's 7 not entirely a circuit. So you could take what Shraga 8 has in some form and put it into Togami. 9 Or when I say "implement," I mean actually 10 physically making it, use this as a -- as a description 11 of how things are connected and what functions they 12 perform. And then implement it in circuitry that would 13 go in Togami. 14 Q. Okay. And after you do this implementation, 15 you end up with some device. You know, we started with 16 this SFP of Togami. It now has some additional 17 implementation in there; right? What would you plug 18 this into? 19 A. Well, in the description of Shraga, let's 20 see. This could potentially be plugged into a router, 21 for example. Or it could be plugged into a switch. 22 Q. A switch like Switch 64 in the ONT of 23 Figure 1 of Shraga? 24 A. It could -- it could be a switch like Switch 25 64. Or it could be a different type of switch. Switch Page 92
1 is, at the end of the day, obvious for a PHOSITA to do; 2 right? In this obvious analysis? 3 A. Right. 4 Q. And, you know, as we discussed earlier, a 5 PHOSITA would start with the Shraga reference and look 6 at the Togami reference; right? 7 A. Yes, that's -- that's true. 8 Q. And based on having those references, it's 9 your opinion that the PHOSITA would somehow modify or 10 take teachings from Shraga and make modifications to 11 the pluggable optical transceiver that is taught in 12 Togami; correct? 13 A. Well, when -- when you use the word 14 "modifications," I don't see it exactly that way. 15 Maybe I'm misunderstanding how you're using the word. 16 The way I see it is that Togami describes the pluggable 17 and talks about circuitry, and -- and so I would 18 implement the functionalities in Shraga in the 19 pluggable, including in the circuitry, of Togami. 20 Q. So I -- I want to ask you about that. When 21 you use the word "implement," that's a little vague. 22 It could mean at least two different things. One 23 way -- one thing it could mean is you just kind of take 24 the circuit out of Shraga and plop it into Togami. 25 That would be an implementation of Shraga's Page 91	1 64 is described as, I believe, switching between 2 different types of data services. But it might be 3 something else. 4 Q. So I -- I just want to make clear the type of 5 network that this modified Togami pluggable transceiver 6 would be plugged into. 7 So if we're looking at Figure 1 of Shraga, we 8 would end up with a -- you know, the head end on the 9 left like we've described, we still have the optical 10 distribution fabric with its fiber cables going out of 11 it. One fiber cable would connect to this modified 12 Togami pluggable; right? And then the other end of 13 that Togami pluggable would plug into the Switch 64. 14 Would that be an example of a final use of this Togami 15 pluggable? 16 MS. RIOLO: Objection. Form. 17 THE WITNESS: That could be an example, that 18 it's plugged into a Switch 64. More generally, we're 19 talking here about a -- a passive optical network in an 20 ONT, so, you know, wherever that ONT lands is where we 21 get plugged. A switch or a router could be one 22 example. 23 BY MR. TONG: 24 Q. And when we talk about this ONT, in -- in the 25 final system that is supposed to be obvious, the use of Page 93

1 To-- this Togami SFP pluggable, it essentially 2 bypasses all of the original components or perhaps 3 makes -- makes them irrelevant or duplicative, all the 4 components of the ONT except for the switch; correct? 5 MS. RIOLO: Objection. Form. 6 THE WITNESS: Digitalizing the pluggable as 7 containing everything other than the switch. It's -- 8 it's possible -- it's possible hypothetically that the 9 pluggable could also contain some kind of a switch, 10 some kind of a simple switch doing the function it 11 describes here, but I'm envisioning this as being a 12 pluggable that plugs into the switch. 13 BY MR. TONG: 14 Q. Okay. And I want to make sure that what 15 you're not envisioning is at the end of the day, that 16 we have Shruga's passive optical network with the head 17 end on the left and the optical distribution fabric in 18 the middle. And then the ONTs still have all of their 19 components, including the optical interface, the 20 framers, the FIFOs, the CLU, the memory, and somehow 21 you would be sticking Togami's pluggable in the middle 22 of that ONT with their -- I guess it's labeled 48, and 23 you plug it into the switch. 24 MS. RIOLO: Objection. Form. 25 THE WITNESS: I thought I was following you, Page 94	1 we? 2 A. That's not what I envision. 3 Q. Okay. So when we would use your modified 4 Togami pluggable in a passive optical network, what 5 you're envisioning is we have the head end on the left, 6 the optical distribution fabric in the middle, we got a 7 fiber cable, it connects to your modified Togami SFP 8 pluggable, and then that can plug into any switch or 9 any router. Is that what you're envisioning? 10 MS. RIOLO: Objection. Form. 11 THE WITNESS: Well, I was giving that as an 12 example of what might follow an ONT. There might be a 13 switch or a router. That doesn't mean any switch or 14 any router, but those are examples of what it could be. 15 BY MR. TONG: 16 Q. Okay. So generally, in the final network 17 that you're envisioning, basically everything in ONT 18 26C, as shown in Figure 1 of Shruga, that's all been 19 effectively replaced by the Togami pluggable, except 20 for possibly a switch; correct? 21 MS. RIOLO: Objection. Form. Objection. 22 Asked and answered. 23 THE WITNESS: The functionality of everything 24 in ONT C shown in Figure 1, except for the possibility 25 of the Switch 64, everything else would be in a Page 96
1 and I'm afraid I didn't follow the whole question. 2 Could you please rephrase? 3 BY MR. TONG: 4 Q. Yeah. So at the end of the day and final 5 network shown by Shruga Figure 1, would the ONT still 6 have the components, other than the switch? 7 A. Yes. The ONT, the pluggable, the pluggable 8 is going to have the components other than the switch 9 and the pluggable would plug into the switch. 10 Now, I've also discussed, and I think I 11 mentioned earlier, the possibility that the pluggable 12 also has a switch inside of it and that the pluggable 13 be plugged into another switch, a network switch of 14 some kind. I think I mentioned that earlier. 15 Q. So in your final combination, you would 16 consider the Togami SFP module with its additional 17 functionalities implemented to be an ONT; correct? 18 A. That's correct. 19 Q. And in the case where -- like if we wanted to 20 plug this into something, what would we plug it into? 21 MS. RIOLO: Objection. Form. 22 THE WITNESS: For example, it could be 23 plugged in a router or a switch. 24 BY MR. TONG: 25 Q. We would not plug it into another ONT, would Page 95	1 pluggable module, as described by Togami as a pluggable 2 module. 3 BY MR. TONG: 4 Q. Thank you. 5 I just want to make clear that it's not the 6 situation where you're -- you're envisioning that 7 Togami's modified pluggable would be plugged into 8 Shruga's network as depicted, without modifications to 9 Shruga's network; correct? 10 A. I wouldn't describe it as modifying Shruga's 11 network, because the only modification would possibly 12 be leaving the switch out of the pluggable. So 13 Shruga's network still has a -- an OLT at the head end, 14 a distribution fabric, broadcasting to a number of 15 ONTs. The network still looks the same. Still a 16 passive optical network. 17 The only difference is that the -- the ONT 18 might or might not contain a switch; the pluggable may 19 or may not contain the switch. The switch can be 20 inside or outside of the pluggable. Otherwise, 21 everything remains the same. 22 Q. Okay. That's the part that I need a little 23 bit of clarification on. Earlier in one of -- in -- in 24 one of your answers, you said that the ONT would be 25 replaced by Togami's pluggable except for the switch, Page 97

1 and now you're saying everything in the ONT would 2 generally still be the same. So could you clarify my 3 misunderstanding. 4 MS. RIOLO: Objection. Mischaracterizes 5 prior testimony. 6 THE WITNESS: I'm not -- I'm not sure what 7 your misunderstanding is. I can try to say it again, 8 taking into account what I think you've been asking me. 9 This Shruga network is a passive optical 10 network. It has an OLT at the head end. It has a 11 distribution fabric to a number of ONTs, and that's 12 going to remain the same. The ONTs now are replaced by 13 pluggables. The ONTs now are -- that functionality is 14 now inside of the pluggable. 15 The only possible modification is that rather 16 than the ONT as shown in Shruga being plugged into 17 another switch, as it could be, there could be another 18 router or another switch in the network following it. 19 But the switch shown in -- in -- in -- in Shruga's ONT 20 could be pulled out. 21 MR. TONG: Thank you. Could we take a very 22 quick five-minute break? 23 THE WITNESS: Sure. 24 THE VIDEOGRAPHER: Time on the monitor is 25 1:23 p.m. We are off the record. Page 98	1 please. 2 A. Okay. 3 Q. This is my best understanding of what your 4 proposed combination is, which is that we have most -- 5 you know, we end up with a network generally as taught 6 by Figure 1 of Shruga, and then we -- in place of many 7 of Shruga's ONT functionality, we now have Togami's 8 pluggable that includes all of that Shruga 9 functionality that you had previously discussed. And 10 that can be plugged into a switch, as depicted on the 11 far right. 12 Is this what you were envisioning as the 13 obvious result from reading Shruga and Togami? 14 MS. RIOLO: Objection. Form. 15 THE WITNESS: So this -- this is close. 16 I've -- I've indicated that there are two 17 possibilities, which are a design choice, as I said in 18 my declaration. One of them being this. And the other 19 one being that the Switch 64 is also included in 20 Togami's module. And then it might be plugged into a 21 different switch. 22 BY MR. TONG: 23 Q. In 2003, were you aware of any pluggable 24 optical transceiver modules that included a switch? 25 A. No, I wasn't. Page 100
1 (Whereupon a short recess was taken.) 2 THE VIDEOGRAPHER: The time on the monitor is 3 1:29 p.m. We are back on the record. 4 BY MR. TONG: 5 Q. I'm going to introduce an exhibit as 6 Prucnal 009. This is a demonstrative crea- -- exhibit 7 that I have created during the break. Please let me 8 know when you have it opened up digitally. It is a 9 three-slide PowerPoint file. 10 (Defendants' Exhibit 009 was marked.) 11 THE WITNESS: Okay. I have it open. 12 BY MR. TONG: 13 Q. Okay. On Figure 1 -- on Slide 1, do you 14 recognize this as Shruga's Figure 1? 15 A. Yes. 16 Q. And then on Slide 2 -- I am having trouble 17 navigating to Slide 2. Okay. So in this viewer, 18 apparently you have to click toward the bottom where it 19 says slide 2 of 3 -- or slide 1 of 3. 20 Okay. What I've shown here is an original 21 and flipped version of Togami's SFP pluggable optical 22 transceiver. 23 Do you recognize that? 24 A. Yes. 25 Q. Okay. And if we could turn to Slide 3, Page 99	1 Q. In 2003, did you ever use a pluggable optical 2 transceiver module that did not include a switch? 3 A. Are you asking me if I actually used one? 4 Q. Used it or worked on it or ... 5 A. I was aware of them. Put it that way. 6 Q. All right. Thank you. 7 So I think this helps to clear up a lot of 8 the confusion. They say -- they say a picture is worth 9 a thousand words. 10 I'm going to move on and go back to the '754 11 patent and -- 12 MS. RIOLO: Peter, I just want to flag. Do 13 we want to break for lunch soon, or ... 14 MR. TONG: If you guys are -- yeah, if you 15 guys are hungry, I'm getting hungry too. I could use a 16 lunch break if that's what y'all want. 17 MS. RIOLO: I think that works for us. 18 MR. TONG: Sure. How long do you guys -- 19 let's go off the record. 20 THE VIDEOGRAPHER: The time on the monitor is 21 1:33 p.m. We are off the record. 22 (Whereupon a lunch recess was taken.) 23 THE VIDEOGRAPHER: The time on the monitor is 24 2:05 p.m. We are back on the record. 25 ///// Page 101

1 BY MR. TONG: 2 Q. Dr. Prucnal, did you talk to counsel at all 3 during lunch break? 4 A. Nothing related to the case. 5 Q. I want to go back to your proposed 6 combination. You had mentioned in one variation of 7 your proposed combination that switching functionality 8 would be implemented in Togami's SFP pluggable module. 9 Do -- do you know what I'm talking about? 10 A. Yes. 11 Q. Okay. Let's talk about a switch. What is 12 the purpose of a switch? 13 A. The purpose of a switch is to -- with a 14 communication system, to provide a set of connections 15 between a set of input ports and a set of output ports. 16 Q. And would it be a switch's job to direct 17 frames, based on their L2 MAC addresses? 18 A. It could be to direct -- to direct signals 19 based upon their MAC addresses. Let's see. Yeah, 20 there could be -- there could be an address that a 21 switch needs to make its switching decision based upon. 22 Q. Not necessarily a MAC address, though; right? 23 A. The address could take various forms. 24 Q. And you mentioned that there are input ports 25 and output ports, and a switch would pick a port based Page 102	1 Q. Let me try and be more specific. The Switch 2 64 in Shraga Figure 1, would a PHOSITA understand that 3 to have multiple outputs based on the three arrows 4 coming out the right side of the switch? 5 A. We had talked about this switch before and I 6 referred to the bottom of Column 7 and top of Column 8 7 in Shraga, which describes the Switch 34 switching 8 between couple services, according to a control signal 9 received from the CLU. 10 So this -- this isn't necessarily switching 11 based upon an address. It's switching based upon a 12 control signal. It's switching between services. 13 Three outputs are shown, 32, that could be three 14 services. It's -- it's -- this is -- this is 15 schematic, so I suppose there could be fewer or more. 16 Q. Can you refer, for example, two services that 17 it is switching between? 18 A. For example. 19 Q. Would it make sense to interpret this as 20 potentially having only one service that it is 21 switching between, or would that be trivial and 22 nonsensical? 23 MS. RIOLO: Objection. Form. 24 THE WITNESS: To me, that's very 25 hypothetical. I really haven't thought about that. Page 104
1 on some form of an address; right? 2 A. Generally speaking, yes. I mean, I'm talking 3 about a network switch here. I don't know how 4 general -- how general you want to be. A switch -- a 5 switch has a control and it has an instruction that 6 determines the path from input to output. In network 7 and routing, we're usually talking about addresses. 8 Q. How many inputs and outputs would a switch 9 need to be nontrivial? 10 MS. RIOLO: Objection. Form. 11 THE WITNESS: I -- I really don't know what 12 you mean by nontrivial. 13 BY MR. TONG: 14 Q. If a switch just had one input port and one 15 output port, is that really a switch? 16 A. We're -- we're -- we're sticking by the large 17 field and we're talking in a lot of generalities. You 18 know, you could have -- you could have something like a 19 time slot interchanger that would be a switch, where 20 the switching is done based upon the arrangement of the 21 time slots. 22 And in that case, you could potentially have 23 one input and one output, and to rearrangement by 24 rearranging the slots. So -- so the question is very 25 sort of overly general, I think. Page 103	1 BY MR. TONG: 2 Q. Okay. Could you please turn to Togami 3 Figure 1 for me. 4 A. Okay. 5 Q. If you were to implement switching 6 functionality, like the Switch 64 of Shraga, where 7 would it go in Togami's Figure 1? 8 A. Well, presumably, if the switch were inside 9 this portable module, it would be closest to the -- it 10 would be closest to the output connector. It wouldn't 11 have to be, but that would be a logical place to put 12 it. 13 Q. And where would the outputs of the switch, 14 for example, the three lines coming out of the right 15 side of Switch 64 of Shraga, where would those outputs 16 go in Togami Figure 1? 17 A. I haven't thought in detail about how the 18 circuit would be wired. But most likely, the outputs 19 of the switch would need to go to the output connector. 20 Q. And by output connector, are we referring to 21 the end marked with numeral 105? 22 A. If that were a switch, and the various 23 services were coming from the outside, as we are 24 assuming, then those services would be coupled through 25 the output connector, which is 105. Page 105

1 Q. And in order to make this work, how would a 2 PHOSITA modify interface 105, if at all, to allow for 3 the three connections -- for connections to three 4 different services, as indicated coming out of Switch 5 64 of Shraga Figure 1? 6 A. I don't know the details of how Togami is 7 wired; so I don't know whether any modification would 8 be necessary for 105 or not. I don't know specifically 9 what those pins are assigned to in this description. 10 Q. The SFP MSA agreement that we have looked at 11 earlier, do you know if that form factor provides for 12 outputs to connect to multiple services? 13 A. I don't know. 14 Q. So back in 2003, we had a network in our 15 house and I had a little box that was a switch and it 16 had four ethernet ports. Would those ports exemplify a 17 connection to a -- the Switch 64 of Shraga? 18 A. Shraga is talking about Switch 34 handling 19 switches between coupled services to the OLT. And in 20 your house back in that time frame, you had an ethernet 21 switch, maybe that 4-by-4 -- maybe that four-port 22 switch was carrying -- carrying signals to different 23 rooms in your house, for example, so those connections 24 may have all been carrying data from different 25 computers in different rooms. Page 106	1 A. I don't remember -- I don't remember it 2 actually saying that it's switching between services, 3 is what I'm saying. 4 Q. Now, could I direct your attention to 5 Column 7 of Shraga, line, I guess, 30. I'm going to 6 read this. It says, "So that OLT 22 is coupled at its 7 upstream side to industry-standard data transfer 8 services such as an Ethernet line 28, a video line 29, 9 and a constant bit rate (CBR) line 30." 10 So I read through about line 32. So would it 11 be -- are these examples of typical interfaces that a 12 PHOSITA might have found on a switch, the examples 13 being an ethernet port or a video line port or a 14 constant bit rate (CBR) port? 15 A. This is talking about what the OLT might be 16 doing at the head end, and that could be typical of a 17 head end, where a variety of services are being 18 distributed through a port. 19 Q. More generally, are these examples of things 20 that a switch could be connected to? 21 A. That's -- that's very, very general. The 22 function of a switch could be doing many things. In 23 this particular case, at a head end where you are 24 likely to be wanting to distribute video and data 25 services, that -- that could be somewhat typical -- Page 108
1 So -- so the switch in -- in Shraga 34 -- 2 excuse me, 64 -- says it's switching between services. 3 I think that's how it's worded. Switching between 4 coupled services. This is talking about the OLT. 5 Q. So what -- what type of interface or port 6 would be used on that switch for connecting to 7 services? 8 A. Yes, yes, that's what I'm thinking about, 9 trying to answer your question. And I notice that the 10 quote that I'm giving you from Shraga is about the 11 Switch 34, in fact, which is in the OLT. And we see 12 that's at the head end. That's -- that switch is on 13 the left side where we talked about the head end being. 14 And those services are -- are labeled. 15 There's three outputs labeled: Ethernet, video, and I 16 think -- I can't quite read what the third one is. So 17 that's where the -- that's where the ser- -- switching 18 between services is occurring. 19 And we sort of jumped over to the Switch 64 20 in the ONT, and making the assumption that that's also 21 switching between services. I don't know where that's 22 described in Shraga, but my recollection is that Shraga 23 said that the operation of the Switch 64 was somehow 24 analogous to Switch 34. 25 Q. Okay. Page 107	1 typical. 2 But, again, turning to the Switch 64 and the 3 ONT, that might be doing something very different. 4 Q. So what -- what is your best understanding of 5 what ports -- what type of ports Switch 64 of Shraga 6 would have? 7 A. I'd like to see what Shraga says about that. 8 Could also be switching between services and could also 9 be doing something else. 10 Q. What type of port would typically be found on 11 a switch like Switch 64 of Shraga? 12 A. I mean, this -- this could be really 13 connected to anything on the downstream side. I would 14 just be speculating. 15 Q. So is it your position, then, that a PHOSITA 16 could not determine what type of port is used on Switch 17 64? 18 MS. RIOLO: Objection. Mischaracterizes his 19 testimony. 20 THE WITNESS: What you do you mean by "what 21 type of port." 22 BY MR. TONG: 23 Q. Like an ethernet port? 24 A. It could be an ethernet port. 25 Q. Are there any other types of ports that that Page 109

1 Switch 64 could have? 2 A. It could be connected to a -- it could be 3 connected to a router. 4 Q. Again, through an ethernet port? 5 A. That could be through a Cat5 cable, for 6 example. 7 Q. And Cat5 ca- -- Cat5 cables connect through 8 ethernet ports; correct? 9 A. They could be. 10 Q. Is there a better name for the type of port 11 that a Cat5 cable connects to? 12 A. Well, it has a Cat5 connector on it. 13 Q. So a Cat5 port? 14 A. Probably. 15 Q. Could you turn back to the SFP MSA 16 agreements. 17 A. Okay. 18 Q. Is there anywhere in this document that you 19 see the standard providing for an ethernet or Cat5 port 20 as part of the SFP form factor? 21 A. No, I don't see anything about it having an 22 ethernet port or a Cat5 port. 23 Q. So if somebody were to modify Togami's SFP 24 pluggable optical transceiver as shown in Figure 1 by 25 adding an ethernet port or Cat5 port, it would no Page 110	1 THE WITNESS: If you had the standard SFP 2 interface, no. It would have to be modified. 3 BY MR. TONG: 4 Q. Let's go back to the '754 patent. Turning 5 back to Claim 1. Okay. Going on from where I left 6 off, we -- I was reading from the -- a control module 7 electrically coupled paragraph. And I had stopped 8 after "optical interface block" on the second line of 9 that paragraph. 10 Now, claim 1 continues, "And configured to 11 receive from the head end of the passive optical 12 network data communications representing one or more 13 start times for transmitting data communications to the 14 head end of the passive optical network and configured 15 to transmit the data communications to the head end of 16 the passive optical network responsive to the start 17 times." 18 Do you see that? 19 A. May I just read it to myself again? 20 Q. Absolutely. 21 A. Thank you. 22 (Witness reviewing document.) 23 Okay. 24 Q. So in your report for this element, you rely 25 again on the CLU of Shraga as implementing this Page 112
1 longer comply with the SFP standard; correct? 2 A. Yes, I think if a -- if a switch such as the 3 one described in Shraga were put into Togami's 4 pluggable, then the switch would have to be a switch 5 whose output would conform to the -- the SFP connector. 6 So it wouldn't be -- it wouldn't be a 7 stand-alone switch that has an ethernet port, for 8 example, as we've been discussing. It would be a 9 different switch. 10 Q. Okay. And when you say that it would have 11 to -- its output would conform to the SFP connector, 12 what do you mean by that? 13 A. There's a certain standard here for what the 14 electrical connection is. Let's see, I think we were 15 looking at this earlier. That that would not be the 16 same connector as would be used in a stand-alone 17 switch. 18 Q. So, for example, back in my house, in 2003 19 where I had a desktop with a Cat5 ethernet cable coming 20 out the back, I would not be able to plug my Cat5 21 ethernet cable into the Togami pluggable optical 22 transceiver that was modified to include a switch and 23 further modified so that the switch output conformed to 24 the SFP interface; correct? 25 MS. RIOLO: Objection. Form. Page 111	1 functionality; correct? 2 MS. RIOLO: Counsel, when you're saying 3 "report," are you referring to his declaration? 4 MR. TONG: I am referring to his declaration. 5 Thank you for the correction. 6 THE WITNESS: Yes, I'm relying on the CLU of 7 Shraga. 8 BY MR. TONG: 9 Q. Okay. Was this explicitly disclosed in 10 Togami anywhere? 11 A. Well, as I said before, Togami has discussion 12 of his pluggable -- pluggable being used in conjunction 13 with a network, with a network protocol. And Togami 14 goes further to describe circuitry that could be used 15 for various purposes, depending upon the application. 16 And so that's where the CLU functionality would be 17 included in Togami. 18 Q. Okay. My question was about whether or not 19 that was explicitly disclosed in Togami. Is the part 20 about -- is the part about Togami's network protocol 21 the closest thing to an explicit disclosure of the 22 claim element that I just read? 23 MS. RIOLO: Objection. Form. 24 THE WITNESS: That's the limit I mention. 25 I'd have to look at the rest of Togami, but that's what Page 113

1 comes to mind. 2 BY MR. TONG: 3 Q. Okay. Well, please let me know if Togami 4 explicitly discloses the claim element that I had just 5 previously read. 6 A. Oh, Togami I do not believe explicitly 7 discusses a CLU. 8 Q. Does Togami explicitly discuss receiving from 9 a head end of the passive optical network data 10 communications representing one or more start times for 11 transmitting data communications to the head end of the 12 passive optical network and configured to transmit the 13 data communications to the head end of the passive 14 optical network responsive to the start times? 15 A. Again, Togami doesn't specifically talk about 16 start times. But more generally talks about having 17 circuitry and functionality for implementing a 18 communication protocol that would include that. 19 Q. And that's the closest that Togami comes to 20 explicitly disclosing this claim element? 21 A. I believe so. 22 Q. Moving on to the next claim element. If you 23 want to follow along, we're now at the top of Column 17 24 of the '754 patent. 25 It is, "An electrical network interface port Page 114	1 electrical connection between the CLU and those FIFO 2 blocks; correct? 3 A. Yes, it is -- it's described functionally in 4 Shraga that there's -- that the CLU controls the data 5 ingress and data egress to and from the FIFO. 6 Q. Okay. And what do you mean by "it's 7 described functionally"? What is described 8 functionally? 9 A. The operation of the CLU and what's -- what's 10 responsible -- what instructions it's responsible for 11 carrying out. 12 Q. And what do you mean by the word 13 "functionally"? 14 A. It's just Shraga says this is what the CLU 15 does. So I'm referring specifically to the newer 16 paragraph 140, where I quote from Shraga as saying that 17 the CLU controls the operation of data ingress 18 (downstream from the head-end) and data egress 19 (upstream to the head-end direction). And data's 20 transferred to the framer from the FIFO by the CLU. So 21 that's what I mean by functional. This is saying what 22 it does. 23 Q. Are you contending that the electrical 24 network interface port is anything else in Shraga? 25 A. I think we discussed this somewhat before, Page 116
1 electrically coupled to the control module and for 2 electrically coupling into the optical module port of 3 the switch or router and for communicating with the 4 switch or router." 5 Do you see that in the '754 patent? 6 A. Yes. 7 Q. Okay. You're going to have to help me 8 understand your theory of what exactly teaches this. 9 In your declaration, you address this in paragraphs 139 10 to 146; correct? 11 A. Yes. 12 Q. Now, you do use the word "electrical network 13 interface port" several times in this section. What 14 exactly are you pointing to as the electrical network 15 interface port in the final combination that a PHOSITA 16 would find obvious? 17 A. There's quite a bit covered in this section, 18 but the electrical interface port, as I described in 19 paragraph 140, is the connection between the FIFO and 20 the CLU. 21 Q. Okay. Thank you. 22 And if we look at Figure 1 of Shraga, there 23 is no line that's explicitly drawn between the FIFO and 24 the CLU, but it's -- it would -- it would have been a 25 PHOSITA's understanding that there is some type of Page 115	1 that there's an interface in Shraga between the FIFO 2 and the switch. And so the electrical interface port 3 would be on the right side of the FIFO, connected to 4 the -- the optical port of the switch. 5 And so I describe this in paragraph 141, that 6 the FIFOs are coupled to the left side of the switch 7 and that the switch is controlled by the CLU. And so 8 for that to occur, the CLU must be coupled to the 9 switch. So that's an additional place where there's an 10 electrical interface port between the FIFO and the 11 switch. 12 Q. What does the word "port" mean in this 13 context? 14 A. A connection. 15 Q. Would you consider a hard-wired soldered 16 connection between electrical components on a PCB to be 17 a port? 18 A. No. I'm not -- I'm not explicitly showing a 19 port that you can -- you can plug into and plug out of. 20 But I'm showing that the equivalent of that, which is 21 this electrical interface, can serve as, you know, the 22 same -- the same purpose. And I said in paragraph 140, 23 this serves functionally as the claimed electrical 24 interface port. 25 Q. Understood. Page 117

1 Is it your position that Togami separately 2 teaches an electrical network interface port or are you 3 just relying on Shraga for that? 4 A. Again, there's more discussion in -- in this 5 section about electrical interface port, but going to 6 your question, in paragraph 144, I talk about Togami's 7 pluggable transceiver, and that is electrically -- 8 electrically interfaced with a host device via a 9 connection port. 10 Q. Is that marked in yellow on page 74 of your 11 declaration? 12 A. Yes. I'm describing the edge connector of 13 Togami, which is highlighted in yellow on page 74. 14 Q. Okay. Thanks. 15 So I'm a little bit confused, and I suspect 16 the board may be a little bit confused, because you've 17 indicated three different things so far as being the 18 electrical network interface port. 19 Is it your position that -- well, I guess, in 20 the final combination, what are you relying on as the 21 electrical network interface port as recited in the 22 context of claim element 1d? 23 A. In the -- in the final combination, any 24 pluggable device will have an electrical connector 25 which is -- which is an electrical interface port Page 118	1 this section covers several possibilities that could 2 satisfy the claim element. And the claim element 3 requires that the electrical network interface port be 4 electrically coupled to the control module. 5 As for electrically coupling to the optical 6 module port of the switch, there's a couple of 7 things -- couple of possibilities that are described in 8 this claim element. I'm saying on one hand, the -- 9 functionally, this could functionally be where the FIFO 10 and CLU are connected. 11 Another -- another possibility is that is 12 where the FIFOs are connected to the left side of the 13 switch. Because the switch is also controlled by the 14 CLU. Now, the way in which the FIFOs could be 15 connected to the switch are at least twofold: One, if 16 the switch is inside the ONT, and the other, being if 17 the switch is outside the ONT, or outside the 18 pluggable. 19 So in that case, the yellow area that's 20 highlighted is not a connector between the CLU and the 21 FIFO. The CLU and the FIFO are inside the pluggable, 22 and the electrical inter- -- the electrical connector, 23 the electrical network interface port is that is 24 highlighted in yellow and that would connect to the 25 switcher router outside. Page 120
1 that's going to couple into the host device, whether it 2 be a switch or a router or a computer. 3 And so combining Togami with Shraga, it would 4 be -- it would be the electrical connector of Togami's 5 pluggable or any small form factor pluggable that might 6 be used. 7 Q. Okay. So a question about that resulting 8 combination. The part that you've highlighted in 9 yellow on page 74 of your declaration, I understand 10 that that is an electrical connector; is it your 11 position that that is equivalent to the electrical 12 interface between the CLU and the FIFO shown on page 72 13 of your declaration? 14 A. No. I've given several examples of what the 15 electrical interface port could be and where it could 16 be found. And the connection to the FIFO was one 17 example. The connection to the switch is another 18 example. 19 Q. And in the final combination that a PHOSITA 20 would make, is it your position that there would be a 21 CLU and a FIFO on opposite sides of the electrical 22 interface that's highlighted on yellow on page 74 of 23 your declaration? 24 MS. RIOLO: Objection. Asked and answered. 25 THE WITNESS: No. What I'm saying is that Page 119	1 BY MR. TONG: 2 Q. So that theory I do understand. And in the 3 case where you're saying that there is a switch 4 included within Togami's final pluggable module, where 5 would the electrical network interface port be? 6 A. That's what's described in paragraph 141, 7 where the FIFOs are coupled to the left side of the 8 switch. These -- these on page 72 are highlighted, the 9 FIFOs are highlighted in yellow, the switch in blue, 10 and where they're connected would be -- would be where 11 the interface occurs. 12 Q. So the example, then, that we had discussed 13 earlier where you pointed to the interface being 14 between the CLU and the FIFO, where would that be in 15 the final resulting combination? 16 MS. RIOLO: Objection. Form. 17 THE WITNESS: So by final resulting 18 combination, are you referring to Figure 1 on page 74? 19 BY MR. TONG: 20 Q. I am referring to Slide 3 of the PowerPoint 21 that I had shared earlier as a demonstrative. 22 A. Okay. I believe I remember that. So in that 23 Slide 3, you had a Togami pluggable device plugging 24 into a separate switch. Is that -- is that fair? 25 Q. Yes. Page 121

1 A. Okay. And so if your question is where -- 2 where are the FIFO -- FIFO and CLU, the FIFO and CLU 3 would be internal to the pluggable. 4 Q. Okay. Sorry. But that's not exactly my 5 question. 6 A. Okay. 7 Q. My question is in that proposed combination, 8 where is the claimed electrical network interface port? 9 A. It -- it would be the interface port 10 highlighted in yellow in paragraph 74 -- I'm sorry, on 11 page 74, paragraph 144. 12 Q. And in your proposed combination where the 13 switch makes its way into Togami's pluggable optical 14 transceiver module, in that variant, where is the 15 electrical network interface port? 16 A. In that variant, where the switch is -- the 17 switch is inside the module, that's going to be 18 described in paragraphs 140 and 141, as being the 19 interface between the FIFO -- it would be the FIFO 20 highlighted in yellow in Figure 1 connected to the 21 switch highlighted in blue in Figure 1 of Shraga. 22 Q. Okay. Thank you. 23 So we've talked about both of your variants 24 now, and it sounds like neither variant uses the 25 interface between the CLU and the FIFO blocks as the Page 122	1 inside of the Togami SFP optical transceiver module, 2 the electrical network interface port between the FIFO 3 block and the switch would not be a physical port that 4 one could plug and unplug things out of; correct? 5 A. That's -- that's correct. It serves it -- 6 serves functionally as an interface port, but not a 7 port in the sense of plugging and unplugging. 8 Q. Okay. Now, in your -- in the variant that 9 I've illustrated in Slide 3 of that PowerPoint, in that 10 case, there actually is a port on a switch that the 11 pluggable module could plug into and out of; correct? 12 A. We're speaking now hypothetically in terms of 13 something that you've drawn, where I have -- I think I 14 have an understanding of what you've drawn, where 15 you've shown a pluggable and then a switch outside of 16 it. I think it was to the right. And in that case, 17 the pluggable has the electrical connector on it and 18 that plugs into the switch presumably. 19 Yeah, you haven't actually shown it in the 20 drawing as I -- as I recall, but that's sort of my 21 understanding of how that might work. 22 Q. Sure. If you could turn to that now, Slide 3 23 of the PowerPoint. 24 A. (Witness complies.) Yes, I've got it. 25 Q. So your answer characterized this as Page 124
1 electrical network interface; is that correct? 2 A. So in the variant where the switch is inside, 3 as is shown in Figure 1 on page 72, in that variant, 4 the ingress FIFO and egress FIFO, which are highlighted 5 in yellow, functionally contain the electrical network 6 interface port, that is interface to the switch, that 7 is inside the pluggable module, or inside the ONT in 8 Figure 1. So the variant where the switch is inside, 9 the interface to that switch is the interface between 10 the FIFO and the switch. 11 Q. Thank you. 12 So it seems like you're agreeing with -- that 13 the CLU FIFO interface is not the interface that we 14 should be looking at for the electrical network 15 interface port in this variant; correct? 16 A. Yes, that's correct. The -- the interface -- 17 the electrical interface port, when the switch is 18 inside, is between the FIFO and the switch, and the 19 discussion of the CLU is there because the claim 20 element requires that -- that the electrical interface 21 port communicates with the switch or the router and the 22 control module. So that's why the CLU is being 23 discussed here, because it does communicate with the 24 FIFO and the switch. 25 Q. And in that variant where the switch is Page 123	1 hypothetical and as my understanding. I tried to 2 depict my best understanding of this variant that you 3 have proposed is obvious to a PHOSITA. Is there any 4 error or inaccuracy in this depiction? 5 A. No, I don't think so. What I meant by that 6 is that this particular drawing that you did shows a 7 Switch 64, and my understanding is that there would be 8 a port on that switch -- an optical interface port on 9 that switch to which you plug in the pluggable on the 10 left. 11 And all I'm saying is that the drawing 12 doesn't -- doesn't show it drawn there. But my 13 understanding is that it's there. 14 Q. Okay. Thank you. 15 Can we turn to paragraph 143 of your 16 declaration. 17 A. (Witness complies.) Okay. 18 Q. First sentence says, "Shraga also indirectly 19 discloses that the host device, such as a switch or 20 router, contains an optical module interface port." 21 So that host device would be Switch 64 or 22 would it be the other switch, 34? 23 A. This is talking about the -- the ONT plugging 24 into the optical module port of a switch or router. So 25 that means that it's the Switch 64. Page 125

1 Q. So you use the language "Shraga also 2 indirectly discloses that the host device," emphasis on 3 "indirectly." 4 Why does Shraga not directly disclose that 5 the switch contains the optical module interface port? 6 A. So the Switch 64 disclosed in Shraga's ONT is 7 inside the ONT. But the switch is coupled to the -- 8 the FIFOs, to the remainder of the ONT; so there's an 9 understanding that there's a connection between the 10 remainder of the ONT and the switch. So if that switch 11 were outside the ONT, there would have to be a port to 12 connect the pluggable to the switch. 13 Q. But Shraga itself does not show the switch 14 outside the ONT; correct? 15 A. Correct. 16 Q. And what Shraga shows is a connection, an 17 electrical connection, between the FIFO blocks and the 18 switch; correct? 19 A. Well, in both cases, whether the switch is 20 inside or outside, there would be an electrical 21 connection between them. 22 Q. And turning to paragraph 142 of your 23 declaration. 24 A. Okay. 25 Q. The second sentence says that, "A PHOSITA Page 126	1 on it, and the -- the receptor that is receiving it, 2 the other side of the port, would be called the optical 3 port or the optical module port. It's the thing you 4 plug the -- the transceiver module into. 5 Q. Okay. So that optical port of a PC, that 6 would not meet the claim element of an electrical 7 network interface port recited in claim 1 that is a 8 part of the network claim optical transceiver module; 9 correct? 10 A. What claim 1 requires is that the electrical 11 interface -- network interface port is connecting to a 12 switcher router, and what paragraph 142 says that in 13 addition, there could be a situation where the ONT is 14 not connecting to a switcher router, but it's operating 15 as a data modem. So that's an example where the ONT 16 could be connected. But that's not connecting -- if 17 that's just connecting to a PC, it's not connecting to 18 a network. 19 Q. And that example of if it were connected to a 20 PC, are you contending that that is an example where a 21 network client optical transceiver module comprises an 22 electrical network interface port, as recited in the 23 context of Claim 1? 24 A. I think it does, because in the example on 25 paragraph 142, what I'm saying is that the -- instead Page 128
1 would have understood that modems connect electrical 2 users, such as PCs, to the network, and thus, for the 3 same reasons discussed above, contain an electrical 4 interface port." 5 Are you proposing a combination where 6 Togami's SFP pluggable could further be modified to 7 encompass the electrical interface ports of PCs? 8 A. What I'm suggesting that is in general, 9 Shraga says that the ONT -- the ONT can operate as a 10 modem, and so it could be connecting a higher speed 11 network to -- to low rate data -- data lines. 12 So, for example, a modem could be connected 13 to a PC and to a network. So in principle -- in 14 principle, the PC could have the interface -- the 15 electrical interface port we're talking about. 16 Q. Okay. So in the context of the claim, the 17 electrical network interface port has to be a part of 18 the optical transceiver module; correct? 19 A. Yes. 20 Q. And an electrical network interface port on a 21 separate PC is not part of that optical transceiver 22 module; correct? 23 A. Yes, I -- I stand corrected. The proper 24 terminology, as you pointed out, is that the -- the -- 25 the pluggable module has the electrical interface port Page 127	1 of -- instead of the -- the pluggable module being 2 plugged into a switch or router, it could be plugged 3 into the -- the optical port of a PC, so the electrical 4 network interface port, which is the port on the 5 outside of the -- on the end of the pluggable is 6 connected into the optical port of the PC. So I think 7 it's still an electrical network interface port, as 8 defined in the claim. 9 Q. So, then, where would the switch or router be 10 if it's not connected to a switch -- a router? 11 A. Well, in that case, it's not plugging into 12 the optical module port in the switch or router. It 13 would be plugged into -- it would be plugged into a PC, 14 for example. And the claims -- the claims. Let's see. 15 I believe the switch or router would not be there in 16 that case. 17 Q. Okay. 18 MS. RIOLO: Peter, we've been going for over 19 an hour. Do we want to stop and take a break? 20 MR. TONG: That's a great idea. Why don't we 21 take a ten-minute break? Let's go off the record. 22 THE VIDEOGRAPHER: The time on the monitor is 23 3:16 p.m. We are off the record. 24 (Whereupon a short recess was taken.) 25 THE VIDEOGRAPHER: Time on the monitor is Page 129

1 3:29 p.m. We are back on the record. 2 BY MR. TONG: 3 Q. Dr. Prucnal, did you speak with your 4 attorneys during the break? 5 A. No. 6 Q. I want to turn your attention to Claim 9 of 7 the '754 patent. Let me know when you have it in front 8 of you. 9 A. Okay's. 10 Q. This says, "The network client optical 11 transceiver module of claim 1, wherein the control 12 module is configured to receive from the head end of 13 the passive optical network and assigned network 14 identification address." And then it continues on from 15 there. 16 Do you see that in the claim? 17 A. Yes. 18 Q. And if we turn to your declaration, your 19 analysis of this element begins on page 90; correct? 20 A. Yes. 21 Q. Now, and you rely on Shraga for this specific 22 detail, right, not Togami? And I -- I understand that 23 your final conclusion includes a combination of Shraga 24 and Togami, but just for -- for the specific detail of 25 "the control module is configured to receive from the Page 130	1 whether that's assigned by the manufacturer. 2 Q. If I connect my smartphone to a router switch 3 combination, it would get assigned an IP address by the 4 router; correct? 5 A. That's right. 6 Q. But it would have its own unique MAC address 7 as part of that connection with the router; correct? 8 A. That's right. 9 Q. And the router does not assign MAC addresses, 10 does it? 11 A. As I recall, the MAC addresses are globally 12 unique. 13 Q. So Claim 9 requires that, "the control module 14 is configured to receive from the head end of the 15 passive optical network an assigned network 16 identification address." Where in -- so I see in 17 Figure 3 that there is an identification address shown. 18 Where does the assignment of that address -- sorry. 19 Strike that. 20 Where is the assignment of that identifier 21 disclosed in Shraga? 22 A. I need to have a look at Shraga to refresh my 23 memory. So in Shraga, on Column 10 around line 56, 24 Shraga describes the header, the downstream header, the 25 sections corresponding to the number of ONTs, and each Page 132
1 head end of the passive optical network an assigned 2 network identification address," which reference are 3 you relying on? 4 A. I'm relying on Shraga. 5 Q. Okay. What in Shraga would have taught this 6 element to a PHOSITA? 7 A. Well, as I describe in this section, in 8 Figure 2, we see the downstream -- downstream frames 9 that have a header and payload. And in Figure 3, the 10 content of the header is expanded to show that it has 11 sections of the payload for a number of different 12 channels, AB through M. 13 And then expanding ONT A, looking at the -- 14 looking at that channel, you can see that that further 15 contains what's called an ONT ID section. And that's 16 what I'm pointing to as the assigned network 17 identification address of that ONT. 18 Q. Thank you. 19 Are you familiar with what a MAC address is 20 in Layer 2 networking? 21 A. Multiaccess control. 22 Q. Is it typically the case that a device 23 manufacturer will assign a MAC address to a network 24 device? 25 A. I don't -- I don't recall at this point Page 131	1 ONT header section comprises a one-byte ONT 2 identification section, which is what I was referring 3 to. It's a one-byte ONT identification section. 4 My recollection is that this 5 identification -- this -- this ONT identification is 6 assigned in one of two ways. One, when -- when a new 7 ONT comes online, the -- the OLT will ask it for a 8 serial -- serial number. And once the OLT has a serial 9 number, it will assign the ONT this identification 10 number that we're talking about. 11 The other way is -- is initiation of the 12 entire system -- I'm sorry, the other way is during the 13 course of operation of the entire system, the OLT may 14 periodically pull all of the ONTs to see who's there, 15 who's listening and to confirm the addresses of the 16 ONTs that are active at that time. 17 Q. And -- and that's from your memory and 18 experience? 19 A. From my memory of looking at Shraga. And my 20 experience. It's consistent with my experience as 21 well. 22 Q. Okay. This section that we looked at in 23 Column 10 of Shraga, it does not describe the power on 24 address assignment protocol; correct? 25 A. Not the sentence that I read, no. Page 133

1 Q. And the section of Shraga that we looked at 2 also does not describe the use of a serial number as 3 part of the add- -- address assignment process; 4 correct? 5 A. Well, I would need to read the rest of 6 Shraga, which could take some time. My -- my eye found 7 this particular place, describing the -- the -- the ONT 8 identification, which is why I read it to you. 9 Q. Okay. Thank you. 10 We can set aside Shraga for the moment. I'd 11 like to turn back to your declaration. Paragraph 106. 12 Please let me know when you have that pulled up. 13 A. Okay. 14 Q. So the second sentence of paragraph 106 is, 15 "Shraga does not, however, expressly disclose a 16 pluggable optical transceiver module as taught in 17 Togami." 18 And you wrote that because you rely 19 exclusively on Togami for this teaching of a pluggable 20 optical transceiver module; correct? 21 A. That is the -- that is the reference that I 22 used to combine the Shraga. 23 Q. And that's because -- 24 A. What I'm trying to say is that I also, in the 25 process, incorporated my general knowledge as a Page 134	1 A. This is referring back to the previous 2 sentence, where -- where I talk about Shraga's ONT, 3 which has an optical interface, and transmits and 4 receives data to and from the optical distribution 5 fabric. And thereby operating as a transceiver and 6 passive optical network. So the function is operating 7 as a transceiver in a passive optical network. 8 Q. Moving on to paragraph 107 of your report. 9 A. Okay. 10 Q. On the second sentence -- well, I'll -- I'll 11 just go ahead and read from the beginning. "A PHOSITA 12 would have been motivated to combine Shraga and Togami 13 for several reasons. First, utilizing the pluggable 14 optical module having a small form factor in accordance 15 with existing standards disclosed in Togami for data 16 communications in a passive optical network, as taught 17 in Shraga" and it goes on from there. 18 By this, are you referring generally to 19 putting Shraga's functionality into the SFP module 20 disclosed by Togami? 21 A. Well, first of all, paragraph 107 starts out 22 by saying that a PHOSITA would be motivated to combine, 23 and by combining, as we've discussed before, that 24 consists of putting Shraga's transceiver, with all its 25 functionality, into Togami's pluggable unit. Page 136
1 PHOSITA, but Togami is the -- is the prior art 2 reference that I used exclusively for the PHOSITA. 3 Q. Later on in that paragraph, it says "Togami's 4 pluggable transceiver" -- well, let me read one 5 sentence before that. So the third sentence of this 6 paragraph says, "As I discuss below, a PHOSITA would 7 have understood that the pluggable transceiver module 8 as contemplated in Togami would have been implemented 9 in an optical network data communications system as 10 taught in Shraga, and it would have yielded successful 11 and beneficial results. Shraga's ONT/ONU has an 12 optical interface that transmits and receives data to 13 and from the optical distribution fabric, operating as 14 a transceiver in a passive optical network. Ex. 1005 15 at 3:39-43, Fig. 1. Togami's pluggable transceiver 16 module would be successful at performing this function 17 because it 'contains a laser transmitter circuit 18 capable of converting electrical signals to optical 19 signals and an optical receiver capable of converting 20 received optical signals back into electrical 21 signals.'" 22 In that last sentence that I just read, where 23 it says "Togami's pluggable transceiver module would be 24 successful at performing this function," what function 25 are you referring to? Page 135	1 But the reason for doing that -- there's 2 several reasons listed in this section -- and in this 3 paragraph, the reason for doing that is that utilizing 4 pluggable optical modulator -- modules was already well 5 known and implemented because there are known benefits 6 to doing that. 7 Q. I want to go to the end of paragraph 107. 8 You have a picture here from Exhibit 1012. 9 A. Yes. 10 Q. Exhibit 1012 was an article, SFF & SFP 11 Optical Transceivers. Do you have a copy of that in 12 front of you? 13 A. I -- I -- I have the -- the figure. Do you 14 mean do I have a copy of the article in front of me? 15 Q. Yes. Do you have a copy of Exhibit 1012? 16 A. I don't think I do, no. 17 Q. I'm going to mark this as the next exhibit. 18 Give me a moment. 19 (Defendants' Exhibit 010 was marked.) 20 MR. TONG: Okay. I'm introducing Prucnal 21 Exhibit 10, which is a copy of Exhibit 1012 from the 22 underlying IPR titled SFF & SFP Optical Transceivers. 23 Please let me know when you have a copy of this opened 24 up. 25 THE WITNESS: It just opened. Page 137

1 BY MR. TONG: 2 Q. Okay. Are you able to zoom in on the figure 3 that's on the cover page? 4 A. I will try. It's very small. Yes, there's a 5 magnifying glass. Yes, I can zoom in. 6 Q. Okay. This figure shows what looks like a 7 lot of pluggable transceiver modules in a DWDM optical 8 network. What does DWDM stand for in this context? 9 A. It stands for dense wavelength division 10 multiplexing. 11 Q. And so we see here several different levels 12 of networks. For example, in the bottom left, there's 13 a LAN, a local area network, and above that, a MAN, 14 which would be metro access network; correct? 15 A. Yes. 16 Q. And there are various, I guess, serial 17 numbers of pluggable optical transceiver modules that 18 could potentially be used at the various levels of 19 these networks. Is that what we see next to these 20 pluggable optical transceivers? 21 A. I'll have a look to see if I can determine 22 what those numbers mean. It looks like they may be a 23 model number of some kind. 24 Q. Do you have any evidence that any of these 25 models of pluggable optical transceiver modules Page 138	1 following the figure we were looking at. 2 Q. Okay. 3 A. So, you know, looking at -- looking at this 4 article more closely, it's describing applications that 5 would include fiber to the home, you know, on the first 6 page of very opening, it says FTTH, which is fiber to 7 the home. And so where one -- where one sees the PONs 8 in this diagram, you know, the access networks use -- 9 there's sonic SDH, there's gigabit ethernet, there's 10 Fibre Channel, and in addition to that, fiber to home 11 is mentioned. And, you know, just wanted to say that 12 certain protocols are required to -- to operate such a 13 system like fiber to home. That would be a PON, for 14 example. I don't believe this explicitly tells me that 15 the functionality is inside of the small form factor 16 unit. 17 Q. If we turn to Table I of this article on 18 page -- what's the second -- yeah, it's the second 19 page, but it's numbered page 93 at the bottom right. 20 Do you see a picture of -- it looks like an SFP module 21 below the table? Sorry, this is an SFF module. 22 A. Yes. Yes, SFF. 23 Q. What does SFF stand for? 24 A. I believe that stands for small form factor. 25 Q. And this would be a type of a pluggable Page 140
1 included the functionality described in the ONT of 2 Shruga? 3 A. Well, no, my point was that one would be 4 motivated to combine Shruga with pluggables because the 5 pluggables are well known. This is an example of them 6 being used in networks. 7 Q. Okay. So these are examples of pluggables 8 that did not have the functionality described in 9 Shruga? 10 A. I haven't looked into that. I don't know 11 what functionality these pluggables have. 12 Q. Okay. Thank you. We can set aside this 13 exhibit. 14 Can we turn to paragraph 109 of your 15 declaration? 16 A. I may have spoken too soon. I will turn to 17 that. Because I hadn't reviewed the article before 18 answering the question, but the article does talk about 19 standards that were used, such as gigabit ethernet 20 standards. I just wanted to mention that before I go 21 on. 22 Q. Okay. Well, let's keep this -- let's keep 23 Prucnal 10 open for a second. Where do you see the 24 mention of the gigabit ethernet standard? 25 A. Oh, so that's at the top of the page Page 139	1 optical transceiver module? 2 A. Yes. I'm just confirming that on the first 3 page. SS- -- SFF stands for small form factor and 4 refers to both SFF and SFP, as we've been discussing. 5 Q. Below Table I, we see several dimensions 6 labeled for this SFF form factor. In the first figure 7 below the table, it looks like it has a width of 13.5 8 or 13.6. Does that seem consistent with your 9 understanding of a typical size of an SFF module? 10 A. Even expanding this, it's quite blurry. I 11 can't -- I can't quite read that. Where are you 12 referring to? 13 Q. Below Table I on the second page. 14 A. Yes. Is that 13.6 a vertical dimension? I 15 can't quite make it out, but is that what you're 16 pointing to? 17 Q. Yeah, that 13.6 in the vertical dimension. 18 A. Okay. Yeah. 19 Q. Is that -- would that be 13.6 millimeters as 20 a typical size of an SFF module? 21 MS. RIOLO: Objection. Form. 22 THE WITNESS: I have not looked into this and 23 I just don't know. 24 BY MR. TONG: 25 Q. Do you think that's referring to 13.6 inches, Page 141

1 which would be more than a foot? 2 A. No, of course not. 3 MS. RIOLO: Objection. Form. 4 THE WITNESS: I don't think that refers to 5 13.6 inches, but I don't know what it refers to. 6 It could be centimeters. I really -- I'm 7 just speculating. 8 BY MR. TONG: 9 Q. Okay. 10 A. I don't know. 11 Q. And so you wouldn't know the dimensions of 12 the -- what unit the -- is being used to mark the 13 dimensions in the other figures right below that; 14 correct? 15 A. Unless I can find a label somewhere for 16 dimensions, I couldn't tell you with certainty. 17 Q. All right. We can set this exhibit aside 18 then. 19 A. Okay. 20 Q. Turning to paragraph 109 of your declaration. 21 You refer to the Fujimori reference, F-U-J-I-M-O-R-I. 22 Did you review Fujimori in your preparation for this 23 deposition? 24 A. No, I didn't. I haven't looked at it in the 25 last couple of days. It's been a while. Page 142	1 any components that were originally present in Togami's 2 pluggable optical transceiver module? 3 A. Oh, I see your question -- I see your 4 question. No, my -- no, no. That wouldn't be the 5 case. What -- what this paragraph means is that Togami 6 could be used to decrease the size of Shraga's ONT, not 7 the reverse. 8 Q. A PHOSITA might need to add components, 9 though, to Togami's pluggable optical transceiver 10 module in order to implement the functionality 11 described in Shraga; correct? 12 A. Well, a design would have to be carried out 13 to determine that. Shraga -- rather, Togami already 14 points out that there are a couple of chips that we can 15 see on the printer circuit board and adding 16 functionality into those chips wouldn't necessarily 17 increase their size, so any Synchronet PGA can do a lot 18 of signal processing in a very small space, so I don't 19 think that adding Shraga's communication protocol would 20 necessarily increase the size of the chip or require 21 other chips. 22 Q. Do you think implementing Shraga's 23 functionality in Togami's chips would have been 24 something that a PHOSITA would have found relatively 25 easy to do? Page 144
1 Q. Going to paragraph 112 of your declaration. 2 A. Okay. 3 Q. About halfway through it says, "Decreasing 4 the transceiver size was a goal of a PHOSITA in the 5 optical network space during the early 2000s as stated 6 in the '754 patent." 7 Do you see that? 8 A. Yes. 9 Q. Is this one of the reasons that a PHOSITA 10 would have wanted to incorporate Shraga's functionality 11 into Togami's pluggable optical transceiver module? 12 A. There's several reasons given, and the third 13 one being that decreasing the transceiver size would 14 have been beneficial. 15 Q. In order to incorporate Shraga's 16 functionality into Togami's optical transceiver module, 17 would a PHOSITA be able to remove components from 18 Togami's device? 19 MS. RIOLO: Objection. Form. 20 THE WITNESS: I don't quite understand the 21 question. 22 BY MR. TONG: 23 Q. The question is: As part of the process of 24 modifying Togami to implement Shraga's functionality 25 that we had discussed earlier, would a PHOSITA remove Page 143	1 A. Absent Togami's design, I don't know that it 2 would be easy to do. But I think -- I think with 3 Togami and Togami's engineering drawing and 4 explanation, that it would then be possible to 5 introduce the functionality of -- of Shraga into To- -- 6 into Togami. 7 Q. For a PHOSITA who had both the Shraga and 8 Togami references, how much design work would a PHOSITA 9 need to do in order to make your proposed combination? 10 MS. RIOLO: Objection. Form. 11 MR. TONG: Sorry. What's wrong with the 12 question? 13 MS. RIOLO: Well, I think it's calling for a 14 certain level of speculation. 15 MR. TONG: Okay. Let's lay some foundation, 16 then. 17 BY MR. TONG: 18 Q. Dr. Prucnal, do you have an informed opinion 19 as to how much design work a PHOSITA would need to do 20 in order to make your proposed combination? 21 A. Well, I think that depends what the eventual 22 goal is of this. If the goal is to simply implement 23 the algorithms described in Togami, the functionality, 24 into -- into the pluggable, I -- I think that would 25 require some design work, but would be pretty much Page 145

1 ensured of success with normal design work. 2 If we're talking about implementing something 3 into a product, then we might want to move from a -- a 4 simple prototype that implements the functionality into 5 an ASIC, which would require further design. 6 So I think it -- I think the -- the level of 7 design could vary with -- with what's desired. But I 8 certainly think that getting Shrags and Togami 9 together, one could, with straightforward design 10 procedures, implement Shrags and Togami. 11 Q. Thank you. 12 Could we turn to your opening expert report 13 from the litigation? 14 A. Okay. I don't have a copy. Did you put that 15 up earlier today? 16 Q. I did put that up earlier. 17 A. Okay. Okay. I got it. 18 Q. Can you turn to paragraph 906, please. 19 MS. RIOLO: I just want to reassert my 20 continuing objection related to the -- the scope of his 21 expert report in this proceeding. 22 MR. TONG: Thank you. You're -- I am 23 reminded of your standing ongoing objection to the use 24 of this report. 25 THE WITNESS: Okay. I'm at paragraph 906. Page 146	1 record. 2 MS. RIOLO: Objection. There's no question. 3 THE WITNESS: "Therefore, because the patents 4 are noticeably devoid of any description sufficient to 5 teach a PHOSITA how to make the claimed functional 6 components within the pluggable optical transceiver 7 module, and because even the inventor themselves 8 admittedly couldn't produce a working prototype, a 9 PHOSITA would not have been able to utilize the alleged 10 invention." 11 Q. Thank you. We can set this exhibit aside. 12 What is the rate that you're being 13 compensated for for your work on this declaration in 14 the IPR? 15 A. I think it was either 795 or \$800 an hour. 16 Q. Let's take a short break. I'm going to go 17 over my notes one more time, but I think we may be done 18 with direct. 19 MS. RIOLO: Okay. 20 MR. TONG: Could we take ten minutes off the 21 record? 22 THE VIDEOGRAPHER: Time on the monitor is 23 4:11 p.m. We are off the record. 24 (Whereupon a short recess was taken.) 25 THE VIDEOGRAPHER: The time on the monitor is Page 148
1 BY MR. TONG: 2 Q. Could you read that into the record for us, 3 please? 4 A. "As discussed throughout this Report, the 5 Asserted Claims of the '754 patent include the 6 requirement that the claimed 'control module' 7 configured to perform certain functionality of a 8 traditional ONT ONU be located on a 'pluggable optical 9 transceiver module.' The incorporation of these 10 functionalities onto the pluggable, separating the 11 invention from a traditional optical transceiver 12 module, was an alleged point of novelty of the '754 13 patent in light of the prior art. The inventors and 14 patent owners of the '754 Patent admit, in the 15 specification of the patent and in deposition 16 testimony, that putting this kind of functionality 17 within a pluggable optical transceiver module is, 'the 18 basis of the invention', and that all other components 19 described in the claims were already well known. This 20 means a PHOSITA would not inherently know how to make 21 the 'control module' of the claimed optical transceiver 22 pluggable. Nor would I expect a PHOSITA to know how to 23 do this in the early 2000s." 24 Q. Thank you. 25 Could you please read paragraph 910 into the Page 147	1 4:21 p.m. We are back on the record. 2 BY MR. TONG: 3 Q. Thanks. I don't have a lot more to cover 4 with you, Dr. Prucnal, just a little bit. During this 5 break just now, did you talk with your attorneys about 6 any potential redirect? 7 A. No. 8 Q. Did you talk with them at all? 9 A. Not at all. 10 Q. Could we turn back to your declaration, 11 paragraph 91. 12 A. Okay. 13 Q. Right above paragraph 91, it says, "Shrags 14 discloses a LAN." Could you please turn to Shrags and 15 tell me why you think Shrags discloses a LAN. 16 A. So what I'm seeing is that according to the 17 logic employed by the -- by the Board, the patent 18 board, that Shrags discloses a LAN, and in the previous 19 paragraph, it talks about some of the Board's comments 20 that distinguished a LAN from a WAN. And one of those 21 distinctions was that Wang, which was a WAN, described 22 multiple customer premises. And this is -- this is the 23 Board's discussion. 24 Shrags discusses an ONT-coupled passive 25 optical distribution fabric to multiple ONTs, forming a Page 149

1 PON. And, again, the Board is saying nowhere in the 2 specification does Shruga claim that the PON consists 3 of multiple customer premises and that Shruga also 4 doesn't disclose amplifying a signal at an OLT, as Wang 5 did. And the Board said that would restrict the 6 applica- -- that would -- if it were amplified, would 7 restrict the applications to a WAN. So because of this 8 logic from the Board, according to the Board, Shruga 9 discloses a LAN. 10 Q. Does Shruga otherwise explicitly disclose a 11 LAN? 12 A. Well, Shruga is disclosing a PON and doesn't, 13 I don't think, explicitly talk about applying a PON to 14 a LAN. But that's what the Board -- according to the 15 Board's definition, the PON would apply to a LAN and 16 not a WAN. Not a wide area network. 17 Q. And you think it's the correct definition 18 that a PON applies to a LAN and not a wide area 19 network? 20 A. Absolutely. A PON -- so a wide area network, 21 as the name implies, has to extend over a wide area -- 22 we talked about that this morning -- and has to include 23 a large number of users. Of course, there's no 24 definitive boundary, but a wide area network would be 25 something like a national network. Page 150	1 figure at the bottom of page 1, and let me know when 2 you have that in front of you, please. 3 A. Okay. 4 Q. So we see there at the bottom left, that's 5 labeled LAN; correct? 6 A. Yes. 7 Q. And that circle is encompassing a data center 8 at -- that's what it's labeled; correct? 9 A. That's right. 10 Q. And toward the bottom right, we see two PON 11 networks. There's an EPON and a GPON. 12 Do you see that? 13 A. Yes. 14 Q. What do EPON and GPON stand for? 15 A. I don't recall, since they're passive optical 16 networks, of course. The E in EPON, I don't recall. 17 The G in GPON, of course, is giving the passive optical 18 network. I don't remember what the E was. 19 Q. Thank you. 20 The GPON network appears to be showing a 21 network from buildings or business to perhaps an ISP. 22 Is that what you would interpret the GPON network to be 23 showing? 24 A. I don't see that. I'm really not sure 25 from -- it's a stick figure, and I'm really not sure Page 152
1 PONs are very limited in their geographic 2 extent, as well as the number of users, because of 3 using the passive -- passive optical distribution 4 fabric. The passive optical distribution fabric 5 divides up the energy of the license for power, and 6 therefore, it can only be divided so many ways, maybe a 7 couple hundred times, not many thousands. 8 And correspondingly in doing so, the reach of 9 the network is limited. It's not going to extend 10 hundreds of kilometers, as one would expect for a WAN. 11 Q. Would it be more accurate that a PON would be 12 used at the broadband access level of a network? 13 A. As to broadband access part of network could 14 be from -- from a central office or a head end to a 15 neighborhood or a group of neighborhoods. A relatively 16 modest distance in a relatively modest number of users. 17 And -- and certainly a PON can carry broadband signals 18 because it's using optical fiber. 19 Q. Could you please pull up Exhibit 10 of this 20 deposition, which was Exhibit 1012 in the IPR 21 proceeding. 22 A. The OK paper? 23 Q. Yes, that's correct. 24 A. Okay. I've got it. 25 Q. And if you could kind of zoom in on that Page 151	1 what it's interconnecting. 2 Q. The EPON network on the bottom right, would 3 you interpret that as connecting residences to their 4 ISP? 5 A. I do see a few things that look like houses. 6 So this could be sending signals from the head end to 7 houses. ISP isn't mentioned on here. Could be that. 8 Q. And right below the EPON circle, it has the 9 word "access." 10 Do you see that? 11 A. Yes. 12 Q. And if you go up one level from the EPON 13 network, the network above that is labeled 14 Metro/Access. 15 Do you see that? 16 A. Right. Yes. 17 Q. In this figure, neither of the LAN 18 networks -- well, strike that. 19 Do you see that there are actually two 20 circles labeled LAN? 21 A. I do. 22 Q. And neither of those are labeled as PONs; 23 correct? 24 A. No. They're not labeled as PONs. 25 Q. Based on this, would a PHOSITA understand Page 153

1 that Shruga's PON network could be deployed in either 2 of the GPON circle or the EPON circle; correct? 3 A. You're saying based upon this figure -- 4 Q. Correct. 5 A. -- Shruga could be deployed in either of the 6 PONs. So I think I want to be clear, that the -- the 7 LANs and the MANs and the WANs here, which would the 8 core network, are based on geographic size, but 9 distinction between the LANs and the GPON and the PONs 10 in this figure have to do with the fact that the 11 line -- the LANs -- if you see in the middle of each 12 LAN, there's a symbol for a switch or a router. 13 Do you see what I'm -- do you see what I'm 14 pointing to where the -- where the MAN is connected to 15 the LAN it's connected to a router, so the LAN is 16 characterized by being relatively small in size, 17 physical size, relatively small number of users, but 18 also using a physical switch or router, whereas the 19 PONs are the -- using the optical fabric to broadcast 20 to the various users. 21 So Shruga could be used for the PONs, but it 22 could also be able to -- it could also be used over the 23 geographic size and typical number of users in a LAN. 24 But I think my point was different. My point was that 25 the PONs cannot be used in a LAN, which would be the Page 154	1 district court litigation between NextGen and Nokia? 2 A. Yes. 3 Q. So I'd like to follow-up with you about that, 4 and if you turn to Exhibit 2, which is a copy of that 5 expert report, and if you'd open it up to page 320. 6 So in this section of your report, do you 7 ever discuss any prior art? 8 A. Just one moment, please. I haven't quite 9 gotten there. 10 No, I don't discuss prior art in this 11 section. 12 Q. And in this section of your report, do you 13 ever discuss the Shruga and Togami combination? 14 A. No. 15 Q. And in this section of your report, do you 16 ever discuss the obviousness of the Shruga and Togami 17 combination? 18 A. Sorry. What page? I think I just scroll 19 past it. 20 Q. Page 320. 21 A. 320? Sorry. 22 No. 23 Q. And do you ever say that the claimed 24 invention of the '754 patent is impossible? 25 A. No. Page 156
1 higher level -- higher use levels of this network. 2 Q. Okay. Thank you for clarifying. 3 What is the typical bandwidth capacity of a 4 PON network in 2003? 5 A. Well, the gigabit PONs were around at that 6 time. And there -- there's standards for the gigabit 7 PONs that specify the data rates. As the name implies, 8 it's looking at individual data channels that are in 9 the gigabit range. It could have been one gigabit or 10 it could have been, you know, maybe up to ten gigabits. 11 I don't know exactly, depending upon the date. 12 MR. TONG: Okay. All right. You can set 13 this aside. 14 I'm done with direct. Pass the witness. 15 MS. RIOLO: Well, you want to take a quick 16 break before? I have a few questions. Or would you 17 like to just keep going? 18 THE WITNESS: I think we can jump into it. 19 MS. RIOLO: Okay. 20 'CROSS-EXAMINATION 21 BY MS. RIOLO: 22 Q. All right. So I just have a few questions 23 relating to what Mr. Tong has been asking about today. 24 So do you remember when Mr. Tong asked you about your 25 expert -- expert report that you submitted in the Page 155	1 Q. And do you remember being asked by counsel 2 about your obviousness combination that includes Shruga 3 and Togami? 4 A. Yes. 5 Q. So I'd like for you to now open up the '754 6 patent. I believe that's Exhibit 7. 7 A. Okay. 8 Q. And can you turn to Figure 1 of the '754 9 patent? 10 A. Yes. 11 Q. What type of figure is this? 12 A. This is a functional rough diagram of the 13 system. 14 Q. And does Figure 1 of the '754 patent show you 15 how to package the components shown in the figure 16 inside of a pluggable device? 17 A. No. 18 Q. Okay. Putting that aside, I'd like to take 19 you to Exhibit 3, which is Togami. 20 A. Okay. 21 Q. And I'd like you to turn to page 2, which 22 shows Figure 1. 23 A. Okay. 24 Q. So what type of figure is shown here? 25 A. As I said earlier, this is -- this is an Page 157

1 engineering drawing. It's -- it shows the mechanical 2 packaging of the pluggable transceiver. This 3 particular figure shows what's inside the packaging, it 4 shows the -- it shows components, and it shows their 5 relative position, shows the printed circuit board. 6 So -- so this is a -- a physical description of the 7 pluggable device and what's inside of it. 8 Q. And is there any figure like this figure 9 you're seeing in Togami in the '754 patent? 10 A. No, I don't believe so. Let me look. No. 11 Q. And is there any figure in the '754 patent 12 that actually shows the physical hardware or electrical 13 components of the claimed optical transceiver 14 pluggable? 15 A. No, there's not. 16 MS. RIOLO: Okay. That's all the questioning 17 that I have. 18 MR. TONG: Okay. Back to recross. 19 20 REDIRECT EXAMINATION 21 BY MR. TONG: 22 Q. Dr. Prucnal, could you open up the expert 23 report from the district court litigation again. 24 A. Yes. I still have it open. 25 Q. Thank you. Could you please turn to Page 158	1 MR. TONG: Yeah, I will try to. I mean. 2 We're busy, busy, busy here. 3 THE WITNESS: Then turn off the video. Turn 4 my video off, that turns this all off? 5 MR. TONG: So I wanted to discuss with you 6 real fast your standing objection to the -- to the 7 relevance of the litigation expert report. 8 MS. RIOLO: Yes. 9 MR. TONG: So under MP EP2011.04 -- if you 10 have an internet browser, you can pull this up and 11 follow along or I'm happy to read it into the record, 12 but this gets at the duty of disclosure or information 13 material patentability, and part of this section in the 14 MPEP says, "If a party to a USPTO proceeding discovers 15 that an earlier position taken in the submission to the 16 USPTO or another government agency was incorrect or 17 inconsistent with other statements made by the party, 18 the party must promptly correct the record." 19 So it's our position that you have a duty 20 under your duty of disclosure to allow this expert 21 report in for purposes of potential inconsistency and I 22 ask that you withdraw all of your relevance objections. 23 MS. RIOLO: Well, I think -- we disagree that 24 it's inconsistent. That any testimony that he's given 25 was inconsistent. I'm not going to withdraw the Page 160
1 page 320. 2 A. Okay. I'm there. 3 Q. In paragraph 906, the last two sentences, 4 they say, "This means a PHOSITA would not inherently 5 know how to make the 'control module' of the claimed 6 optical transceiver pluggable. Nor would I expect a 7 PHOSITA to know how to do this in the early 2000s." 8 In your opinion, would a PHOSITA have been 9 aware of references like Togami and Shraga? 10 A. Yes, I think so. 11 MR. TONG: I'm -- I'm done with recross. 12 Pass the witness. 13 MS. RIOLO: Okay. I think -- I don't think 14 we have any re-redirect either; so I think we're done. 15 MR. TONG: Okay. Counsel, before we go off. 16 Dr. Prucnal, thank you for your time today. 17 You may be excused from the deposition. It was a 18 pleasure, and, you know, we really appreciate having 19 you. 20 Counsel, if you could stay on for just a 21 moment, I do want to resolve an objection with you on 22 the record. 23 MS. RIOLO: All right. 24 THE WITNESS: It was a pleasure meeting you 25 as well. Thank you. Would you like me to leave? Page 159	1 objections because there's a lot that's in his expert 2 report that isn't relevant to this proceeding. And 3 we've discussed the expert report as a whole, and so 4 that -- that's what the objections were directed 5 towards. 6 MR. TONG: Okay. Thank you for clarifying. 7 If we were to introduce as evidence the sections of his 8 expert report that we have covered in the deposition 9 today directed to enablement and written description, 10 would we -- would you object to submitting just those 11 excerpts as evidence? 12 MS. RIOLO: No, we won't object to that, but 13 I just want to reiterate again that we disagree that 14 there's any kind of inconsistency shown in those -- in 15 those sections of his report. 16 MR. TONG: Okay. I understand your argument 17 that you disagree. It's our position it does show some 18 inconsistency. That -- you know, that will ultimately 19 be for the Court to evaluate, but thank you for 20 clarifying your position. 21 MS. RIOLO: Right. 22 MR. TONG: With -- with that, we are -- I'm 23 okay to go off the record if you are. 24 MS. RIOLO: Okay. And I just want to say -- 25 hold on. Page 161

1THE VIDEOGRAPHER: Sorry. 2MS. RIOLO: I just want to say on the record 3that we reserve the right to review and submit an 4errata. 5MR. TONG: Of course. 6MS. RIOLO: Then I think -- 7THE VIDEOGRAPHER: Sorry. 8MS. RIOLO: We're done. We can close the 9record. 10THE VIDEOGRAPHER: This concludes today's 11videotaped deposition of Dr. Paul Prucnal. Total 12number of media today is three. The time on the 13monitor is 4:46 p.m. We are off the record. 14(DEPOSITION CONCLUDED AT 4:46 P.M.) 15(SIGNATURE RESERVED.) 16 17 18 19 20 21 22 23 24 25 Page 162	1VERIFICATION OF DEPONENT 2 3I, PAUL PRUCNAL, PH.D., have read the 4foregoing deposition testimony, which was reported by 5Kristy Clark, RPR and Notary Public in and for the 6State of North Carolina, on June 29, 2024. 7I find the transcript of my testimony to be 8true and accurate according to my testimony on that 9date, with the exception of _____ corrections as 10listed on the attached errata page, which was completed 11by me. 12 13 14_____ PAUL PRUCNAL, PH.D. 15_____, 2024. 16 17 18Sworn and subscribed to before me 19this ____ day of _____, 2024. 20 21_____ Notary Public 22My commission expires:_____ 23 24 25 Page 164
1STATE OF NORTH CAROLINA) 2) C E R T I F I C A T E 3COUNTY OF MECKLENBURG) 4 5I, Kristy Clark, Notary Public, do hereby 6certify that PAUL PRUCNAL, PH.D. was duly sworn by me 7remotely prior to the taking of his deposition; that 8said deposition was taken and transcribed by me; and 9that the foregoing pages are a true and accurate 10transcript of the testimony of said witness. I further 11certify that the persons were present as stated. 12I further certify I am not of counsel for or 13in the employment of any of the parties to this action, 14nor am I interested in the result of said action. 15IN WITNESS WHEREOF, I have hereunto 16subscribed my name, this 8th day of July, 2024. 17 18 19 20 21 22KRISTY L. CLARK, CCR, RPR 23Notary #201807900150 24My Commission Expires: 3/20/2028 25 Page 163	1ERRATA PAGE 2Page # Line # Change/Correction (& Explanation) 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21The above changes were noted by me on this errata page 22before signing the attached verification of deponent. I 23have retained a copy of this errata page for my 24records, and the court reporter is to attach this page 25and my verification to the original transcript. 26Dated:_____ 27PAUL PRUCNAL, PH.D. Page 165

1 MARY RIOLO, ESQ. 2 mary.riolo@alston.com 3 July 8, 2024 4 RE: Nokia Of America Corporation v. Soto, Walter And Soto, Alexander 5 6/29/2024, Paul Prucnal, Ph.D. (#6717942). 6 The above-referenced transcript has been 7 completed by Veritext Legal Solutions and 8 review of the transcript is being handled as follows: 9 ___ Per CA State Code (CCP 2025.520 (a)-(e)) – Contact Veritext 10 to schedule a time to review the original transcript at 11 a Veritext office. 12 ___ Per CA State Code (CCP 2025.520 (a)-(e)) – Locked .PDF 13 Transcript - The witness should review the transcript and 14 make any necessary corrections on the errata pages included 15 below, notating the page and line number of the corrections. 16 The witness should then sign and date the errata and penalty 17 of perjury pages and return the completed pages to all 18 appearing counsel within the period of time determined at 19 the deposition or provided by the Code of Civil Procedure. 20 Contact Veritext when the sealed original is required. 21 ___ Waiving the CA Code of Civil Procedure per Stipulation of 22 Counsel - Original transcript to be released for signature 23 as determined at the deposition. 24 ___ Signature Waived – Reading & Signature was waived at the 25 time of the deposition. Page 166	
1 _X_ Federal R&S Requested (FRCP 30(e)(1)(B)) – Locked .PDF 2 Transcript - The witness should review the transcript and 3 make any necessary corrections on the errata pages included 4 below, notating the page and line number of the corrections. 5 The witness should then sign and date the errata and penalty 6 of perjury pages and return the completed pages to all 7 appearing counsel within the period of time determined at 8 the deposition or provided by the Federal Rules. 9 ___ Federal R&S Not Requested - Reading & Signature was not 10 requested before the completion of the deposition. 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 Page 167	

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Federal Rules of Civil Procedure

Rule 30

(e) Review By the Witness; Changes.

(1) Review; Statement of Changes. On request by the deponent or a party before the deposition is completed, the deponent must be allowed 30 days after being notified by the officer that the transcript or recording is available in which:

(A) to review the transcript or recording; and

(B) if there are changes in form or substance, to sign a statement listing the changes and the reasons for making them.

(2) Changes Indicated in the Officer's Certificate.

The officer must note in the certificate prescribed by Rule 30(f)(1) whether a review was requested and, if so, must attach any changes the deponent makes during the 30-day period.

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