

1 UNITED STATES PATENT AND TRADEMARK OFFICE
2 BEFORE THE PATENT TRIAL AND APPEAL BOARD
3

4
5 CISCO SYSTEMS, INC.,
6 Petitioner

7 v.

8 ORCKIT CORPORATION,
9 Patent Owner.

10
11 Case IPR2023-00401

12 U.S. Patent No. 7,545,740
13

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16 DEPOSITION OF DR. HENRY HOUH
17 TAKEN REMOTELY BY VIDEOCONFERENCE
18 November 14, 2023
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24 Reported by: Mary Ann Payonk

25 Job No. 1198

November 14, 2023

9:30 a.m.

DEPOSITION OF HENRY H. HOUH, Ph.D., taken
remotely by videoconference pursuant to Notice and
agreement of counsel, stenographically reported by Mary
Ann Payonk, Shorthand Reporter and Notary Public, CA CSR
No. 13431.

All attorneys participating in this deposition
acknowledge that the reporter is not physically present
in the deposition room and there is no objection to the
oath being administered remotely.

1 APPEARANCES:

2 ON BEHALF OF PETITIONER:

3 CALMANN J. CLEMENTS, ESQ.

4 GREGORY P. HUH, ESQ.

5 HAYNES BOONE

6 6000 Headquarters Drive, Suite 200

7 Plano, TX 75024

8
9 ON BEHALF OF PATENT OWNER:

10 STEPHEN MCBRIDE, ESQ.

11 CARMICHAEL IP, PLLC

12 8000 Towers Crescent Drive, 13th Floor

13 Tysons, VA 22182

14
15 GEORGE STAMATOPOULOS, ESQ.

16 KOBRE & KIM

17 800 Third Avenue

18 New York, NY/10022

19
20 ALSO PRESENT:

21 Anniliese Coleman, BlueBear Solutions

1 HENRY H. HOUH, Ph.D.,

2 called as a witness, having been duly
3 sworn, was examined and testified as
4 follows:

5 EXAMINATION

6 BY ATTORNEY STAMATOPOULOS:

7 Q. Good morning, Dr. Houh. How are you?

8 A. I'm well, thank you. How are you?

9 Q. I'm doing well.

10 Could you please state your name just for the
11 record, sir.

12 A. My name is Henry H. Houh, and that's spelled
13 H-O-U-H.

14 Q. Thank you, sir.

15 Dr. Houh, do you -- have you ever been deposed
16 before?

17 A. Yes.

18 Q. Approximately how many times?

19 A. I've lost count, but probably over 100.

20 Q. Okay. And you've testified at trial?

21 A. Yes.

22 Q. And you understand that your testimony here
23 today is under oath. Right, sir?

24 A. Yes.

25 Q. And it's under oath just like it would be in a

1 court of law. Right, sir?

2 A. Yes, I understand that.

3 Q. Is there any reason why you can't give
4 accurate and complete testimony here today?

5 A. No.

6 Q. So I'll ask that in answering my questions,
7 you try to provide verbal answers as opposed to gestures
8 or nonwords or nonverbal cues. That's so that the court
9 reporter can capture your answer.

10 Is that fair, sir?

11 A. Yes. I'll do my best.

12 Q. And thank you.

13 If you find a question that I've asked to be
14 unclear, I'll ask that you just let me know, and I'll
15 try to ask a clearer or better question.

16 Fair?

17 A. Sure, that sounds good.

18 Q. And your lawyer may at times object. Even if
19 your lawyer objects, unless instructed not to do so, you
20 should still answer my questions.

21 Fair?

22 A. Yes.

23 Q. And if I've asked a question and moved off
24 topic and you think of something later that pertains to
25 an earlier question, just let me know and we can go back

1 and revisit that question.

2 Fair?

3 A. Yes.

4 Q. Great.

5 Now, Dr. Houh, you've been retained in this
6 case as an expert witness on Cisco's behalf. Correct?

7 A. Yes.

8 Q. Who reached out to you in connection with
9 serving as an expert in this case?

10 A. I don't -- I don't remember the exact person
11 right now.

12 Q. Was it one of your lawyers here today?

13 A. I'm not sure if it's one of the lawyers here
14 today or a different lawyer.

15 Q. Have you ever previously served as an expert
16 in any other matters involving Cisco?

17 A. Yes.

18 Q. Approximately how many times?

19 A. I don't know the exact number. It's probably
20 around 10.

21 Q. Is it reflected in your resume?

22 A. I'm not sure if it is or not.

23 Q. So you provided a resume in connection with
24 this case. Correct?

25 A. I did, yes.

1 Q. Was it attached to one of the declarations
2 that you submitted?

3 A. Yes. I believe it's Exhibit 1004 in this
4 case.

5 Q. Okay. And you were careful to make sure that
6 everything on your resume was accurate?

7 A. I -- I generally am, yes. I generally try to
8 do that.

9 Q. So generally, to the extent that you've
10 testified or served as an expert on Cisco's behalf, that
11 would be reflected in your resume. Right, sir?

12 A. No, not necessarily.

13 Q. Why not?

14 A. I have a number of cases that the clients
15 request I keep confidential, so if that's the case, I
16 typically would not put it on my CV.

17 Q. Okay. The cases that were not confidential,
18 those were included in your CV, right?

19 A. Not necessarily. I try to get a -- a -- an
20 accurate list, but it's possible that I -- I may have
21 missed some cases even though they're nonconfidential.

22 Q. Okay. Now, have you ever served as an expert
23 against Cisco?

24 A. No, I have not.

25 Q. And each time you served as an expert for

1 Cisco you were paid for your services, sir. Right?

2 A. I -- I'm paid for my services generally, yes.

3 Q. Now, over the years and for all the times that
4 you've served as an expert for Cisco, how much would you
5 say you've been paid in connection with your service as
6 an expert witness?

7 A. Boy, I don't really know how to estimate that.
8 It's a number of cases. I -- I don't know if I could
9 give you a very accurate number.

10 Q. But you said you've testified for Cisco
11 approximately 10 times. Right?

12 A. I said I'm not sure of the exact number, but
13 it's probably -- could be around that -- that many
14 times.

15 Q. So in a -- in a given case serving as an
16 expert for Cisco, how much would you say, on average,
17 you are paid for such a case?

18 A. I -- that's hard to ballpark that. It's
19 probably 15- to 25,000, around that ballpark, but I
20 really -- that's kind of a guesstimate or, sorry, an --
21 you know, an -- it's hard to say. I -- I wouldn't
22 really know, but that's just what I would estimate,
23 thinking about it generally.

24 Q. Understood.

25 And, sir, are you expecting currently that you

1 will be testifying in connection with any other matters
2 relating to Cisco?

3 ATTORNEY CLEMENTS: Objection. Scope.

4 A. Yes, I would. Can you -- sorry. Could you
5 repeat that question again, please?

6 BY ATTORNEY STAMATOPOULOS:

7 Q. Are you expect -- well, I'll -- let me -- let
8 me ask the question slightly differently. I won't be
9 able to repeat it verbatim.

10 Are you expecting to have to testify in
11 connection with any other matter relating to Cisco, as
12 you sit here today?

13 A. Probably. I would expect to.

14 Q. What's the basis for that expectation?

15 A. I'm in -- I'm in the process of -- of
16 submitting some more declarations for another case.

17 Q. Does that case involve Orckit Corporation?

18 A. No. I mean, if you exclude tomorrow, of
19 course. But -- but no.

20 Q. Right, right. Let me clarify. I was asking
21 in addition to the cases relating to Orckit Corporation.

22 A. Oh, yeah, yeah. I mean, I -- I --

23 ATTORNEY CLEMENTS: Object to scope.

24 A. -- think I would expect to, but I haven't been
25 noticed in another case and I wouldn't know until, you

1 know, I submit the declaration and -- and noticed.

2 Q. Understood.

3 (Reporter clarification.)

4 BY ATTORNEY STAMATOPOULOS:

5 Q. Dr. Houh, could you please describe for me the
6 nature of your relationship with Cisco other than your
7 serving as an expert on cases that involve Cisco.

8 A. I mean, I don't think I really have much of a
9 relationship with Cisco outside of the expert work I do
10 for them, for the -- or for their attorneys.

11 Q. Understood.

12 Now, sir, did you do anything to prepare for
13 your testimony today?

14 A. Yes.

15 Q. At a high level, what did you do to prepare
16 for your testimony?

17 A. I reviewed a number of documents, and I met
18 with an attorney.

19 Q. And who was the attorney with whom you met?

20 A. Calmann.

21 Q. That's -- that's Mr. Clements sitting here
22 today?

23 A. Yes.

24 Q. And you said you'd reviewed a number of
25 documents.

1 Approximately how many documents would you say
2 you reviewed?

3 A. Maybe six or seven. I don't remember the
4 exact number. Around --

5 Q. Do those documents --

6 A. Give or take a few.

7 Q. I apologize for speaking over you, sir. I'll
8 try to do a better job to avoid that.

9 And the documents that you reviewed, are those
10 all listed in your declaration?

11 A. No, I don't think they're all listed in my
12 declaration.

13 Q. Do you have the documents that you did not
14 review in connection with your declaration in front of
15 you?

16 ATTORNEY CLEMENTS: Objection. Scope.

17 A. I -- I have an electronic copy on the computer
18 in front of me, but I don't have paper copies.

19 (Reporter clarification.)

20 THE WITNESS: I can't remember the question,
21 sorry.

22 ATTORNEY STAMATOPOULOS: Would the court
23 reporter read the question again.

24 (The reporter read from the record.)

25 ATTORNEY STAMATOPOULOS: Let me ask the

1 question again.

2 BY ATTORNEY STAMATOPOULOS:

3 Q. So you reviewed some documents that are not
4 listed in your declaration in connection with your
5 deposition today?

6 A. Yes.

7 Q. What are those documents?

8 A. I -- I reviewed the institution decision, and
9 I reviewed the patent owner's preliminary response.

10 Q. Okay. Did you at any point meet with anybody
11 at Desmarais, the Desmarais law firm?

12 A. Not with respect to this IPR.

13 Q. Was it in connection with another matter
14 involving Orckit Corporation?

15 ATTORNEY CLEMENTS: Objection. Scope.

16 A. I don't think so.

17 BY ATTORNEY STAMATOPOULOS:

18 Q. Was it recently that you met with Desmarais?

19 ATTORNEY CLEMENTS: Objection. Scope.

20 A. I don't think so.

21 BY ATTORNEY STAMATOPOULOS:

22 Q. Do you remember with whom you met from the
23 Desmarais law firm?

24 ATTORNEY CLEMENTS: Objection. Scope.

25 A. I mean, not off the top of my head.

1 BY ATTORNEY STAMATOPOULOS:

2 Q. Now, you submitted two declarations. Well,
3 let me withdraw that.

4 You've submitted a declaration in connection
5 with this IPR. Correct?

6 A. Yes.

7 Q. And you reviewed that declaration in
8 connection with preparing for your deposition today.
9 Correct?

10 A. Yes.

11 Q. And I'd like to pull up Tab 1.

12 A. Well, sorry, I -- I didn't understand what
13 you're trying to pull up.

14 Q. Oh, one second.

15 Do you have your declaration in front of you,
16 Dr. Houh?

17 A. I have a paper copy and I have an electronic
18 copy. Do you want me to open -- I'm going to open my
19 electronic copy.

20 Q. You can open your paper copy. I'm just going
21 to share it on screen as well --

22 A. Okay.

23 Q. -- just so that everybody can see it, if
24 you'll bear with me for one second.

25 And does this look like the first page of your

1 declaration, Dr. Houh?

2 A. Sure. Yes.

3 ATTORNEY STAMATOPOULOS: Okay. I'd like to
4 mark this as Exhibit 1 to this deposition.

5 (Exhibit No. 1 was marked for identification.)

6 BY ATTORNEY STAMATOPOULOS:

7 Q. Now, Dr. Houh, in reviewing your declaration
8 did you discover any errors that you would like to
9 correct?

10 A. No, I don't recall any.

11 Q. Fair to say then that your declaration as
12 submitted is an accurate representation of your opinions
13 in this IPR?

14 A. Yes, I think that's fair.

15 I don't recall any typos either that would
16 change any meaning of anything. But, I mean, there
17 could be still some typos.

18 Q. Is there anything that you would like to add
19 to your declaration?

20 A. Not that I can think of.

21 Q. Thank you. All right, I'll put this down.

22 Dr. Houh, can you walk me through your
23 professional background at a high level?

24 A. Sure. I went to grad school and I got a Ph.D.
25 from MIT in electrical engineering and computer science.

1 And I did some -- I worked in a networking group there
2 and helped develop a high-speed network.

3 And for my Ph.D. thesis, I -- it was -- it was
4 a networking-based thesis. From there, before I
5 graduated, I joined a startup on -- a kind of a
6 voice-over-IP startup called NBX. It was the first
7 company to -- to build a network-based PBX system, which
8 is like a business phone system that runs in an office
9 over the data network as opposed to separate wires for
10 telephones.

11 From there I went to a company called
12 Teradyne, where I worked in software testing with a -- a
13 bunch of companies within Teradyne that got spun out as
14 a separate company and became a company known as
15 Empirix.

16 And Empirix was a -- the standalone software
17 test entities that -- that Teradyne had acquired over
18 some period of time, and I -- I worked in a -- in
19 telecommunications testing and -- and web testing at
20 a -- at a higher level and strategic level when I was
21 there. And I helped develop a few new products,
22 including one called Packet Sphere, which was directed
23 towards network testing.

24 I'm trying to think of what happened next.
25 I -- can I pull up my CV?

1 Q. Absolutely. In fact, let me pull it up on
2 screen. And I assume you have a paper copy. And you
3 should feel free to look at that paper copy. I'll just
4 ask you a couple questions about the CV before we --

5 A. Yeah, I don't -- I don't have a paper copy,
6 actually. I have an electronic copy.

7 Q. Oh, that's -- that's fine. You can look at
8 the electronic copy as well. But let me -- let me pull
9 it up on screen. So this is -- does this look like an
10 accurate -- one second. Apologies.

11 Dr. Houh, does this look like an accurate copy
12 of your CV? I'll just flip through it and --

13 A. Yeah. Yes, it looks like a -- the copy that
14 was submitted when I filed the declaration.

15 Q. And I'll -- and I'll represent to you that
16 this is the copy that you submitted in connection with
17 one of the declarations that you have submitted in this
18 case.

19 Are there any differences between the
20 different CVs that you have submitted as attachments to
21 your different declarations that you can think of?

22 A. I don't -- I'm not sure if they were filed at
23 the same time, but if they weren't, I may have updated
24 it. But I haven't done a comparison between this and
25 the other Orckit case CV that was filed.

1 Q. Understood. All right.

2 Well, if you spot any material differences in
3 this CV if I ask you questions about it, feel free to
4 let me know and, you know, we can pull up a different
5 copy. For now, I've -- I've taken one of your CVs from
6 the two declarations that you submitted.

7 In any event, you were walking me through your
8 professional background. And I believe we were at
9 Empirix when you asked to consult with your CV?

10 A. Thank you.

11 Q. So feel free to continue.

12 A. Okay. So from Empirix, I went to work --
13 well, I went to go -- the founder of -- of the NBX or
14 that voice-over-IP company or the network-based PBX
15 company that -- that I worked at, he was a venture
16 capitalist at -- he became a venture capitalist
17 subsequent to selling that company to 3Com.

18 And he was at Commonwealth Capital, and he
19 asked me to go, you know, explore some -- brainstorm
20 some new startups with him, so I -- I spent some time
21 working with him at -- as -- as kind of like an
22 entrepreneur-in-residence at -- at Commonwealth Capital.

23 And then one of the deals that came across
24 that -- that venture capital company that they did
25 subsequently invest in was a -- a deal to spin the

1 former BBN Technologies out of Verizon, which had
2 purchased BBN some years earlier, and so I joined -- so
3 he was tapped to help commercialize technologies at BBN.

4 BBN is an age-old consulting company, or
5 research and development kind of consultants, or really,
6 just an R&D firm that had a lot of contracts in -- for
7 example, BBN had -- and of course I wasn't there at the
8 time, but BBN had the first contract to build the
9 ARPANET when the -- and they helped invent the router,
10 and they helped invent email.

11 And -- and they never really commercialized
12 it, so the idea that the venture capitalists had was to
13 kind of dig through kind of the research and development
14 projects that were developed at BBN and see if any --
15 whether there was any merit in spinning -- in creating
16 some companies around some of the old research projects
17 and then potentially spinning them out.

18 So my old boss, Alex, I -- I don't know if he
19 was actually my boss at NBX, but the -- the founder of
20 the company, he was tapped to head up a new division
21 within the spun-out BBN. And I -- I joined him, you
22 know, within days, maybe a week of him starting at BBN
23 to kind of -- that was the idea, anyway. He'd get
24 started and I'd join him to help commercialize some of
25 these technologies that -- that were developed at BBN.

1 And at BBN, I worked on a number of -- they're
2 kind of a diverse set of projects, three or four
3 different new projects that were pretty much mostly
4 based on the research projects, which is exactly what --
5 what the -- what the plan was with this new division.
6 And I think those are listed here.

7 I worked on a project called PodZinger,
8 which -- which we -- we leveraged BBN's research and
9 development in speech and natural language processing.

10 BBN at the time had the -- the most accurate,
11 or based on, I think, various evaluations, the most
12 accurate large-language speaker-independent speech
13 recognition system. And so we took that system, and
14 actually, I -- I helped build the prototype.

15 I hired someone to work with me on that. And
16 I -- I kind of wrote up the business model, business
17 plan for that. And that was an audio/video search
18 engine that we would crawl and retrieve audio and video.
19 Mostly podcasts, initially, and then other videos.
20 Build -- do speech recognition on it and allow the --
21 the transcript of the video and audio to be searched and
22 so people could come to our website and find them.

23 And then we built a company around that called
24 PodZinger, which we did spin out, and it received some
25 external venture capital funding. That was one of the

1 companies.

2 Another internal effort I worked on while I
3 was there was called Boomerang, and that was based again
4 on an R&D project of BBN's that -- that was done before
5 I got there.

6 But at the time I arrived, I think there was
7 some effort to build some units actually, because they
8 got an order -- they got a request from the Defense
9 Department to dust off that project and -- and build a
10 number of prototypes and then production units.

11 And I took over the engineering. At the time,
12 we were trying to deliver production units. And I
13 worked on that project. That was a counter-sniper
14 system so that if you're driving on -- a -- a vehicle
15 like a Humvee and you're being shot at, the -- our
16 system would announce inside the cab that bullets were
17 being fired, from what direction, and what range and
18 elevation they were -- they were coming from. And we
19 got a lot of great feedback from them, and I think we
20 saved a lot of lives of -- that was deployed in Iraq
21 and -- and then in Afghanistan. So I'm really -- that's
22 one of the most rewarding projects I've worked on.

23 There was another effort to -- there was a
24 service that BBN had been doing for years before I
25 arrived about analyzing call centers, the -- the

1 performance of call centers. And I helped turn that
2 into a software-as-a-service business in which calls to
3 a -- a system, like a company's, you know, main call-in
4 number, interactive voice response unit, were recorded.
5 And then again, we used speech recognition to analyze
6 the call and -- and capture the whole call from start to
7 end and then -- and then make recommendations.

8 The service was to make recommendations on,
9 you know, how the -- the bugs could be fixed or how
10 improvements could be made to the system and -- and
11 catch, you know, the occasional call that went awry and,
12 you know, someone sat on hold for hours and no one knew
13 why.

14 So we turned that into a software as a service
15 where we allowed the customers to browse through all
16 calls, search for various call events that -- that may
17 have happened that might have been buggy. And the
18 customers themselves could listen to the -- the calls
19 and try to use our tool to help -- well, our tool was
20 used to help improve the performance of the various call
21 centers.

22 So I helped -- I hired someone to build the
23 first site for that as well and manage the -- the
24 building, and then I managed the engineering of that.
25 And then I found a new general manager to kind of come

1 in and drive the business.

2 And eventually, that project -- that -- that
3 service was used, you know, by -- I mean, it had
4 customers such as Dell Computer and the CMMA. That's
5 the Center for Medicare and Medicaid Services. I think
6 every call during the launch of -- of the -- of
7 Obamacare went through our system. Every call that went
8 into the call center for -- for Obamacare went through
9 our system to help them improve the quality and
10 responsiveness and catch bugs. So that was one effort
11 that I did.

12 And there was another effort that I built a
13 website called Group Of, and it was a kind of a social
14 networking website focused on private group sharing.
15 And that -- that effort got acquired by a company called
16 Eons, so then that's when I transitioned to Eons,
17 because they acquired this project and I became the
18 chief technology at Eons.

19 And -- and I spent some time there, but not
20 very long. And after that, I -- I left. I had -- I
21 moved on from Eons and I started doing more -- I started
22 doing some expert witness consulting. And then
23 subsequent to that, I started an educational company.

24 Well, I first started a robotics team, and it
25 turned into a full-blown educational company with a

1 7,000-square-foot facility. And we -- we taught kids
2 science technology entering arts and math classes. We
3 developed all our own classes, things like Lego
4 robotics, laser cutter -- you know, designing things
5 to -- to make on the laser cutter, programming classes
6 like Scratch programming.

7 And we started teaching 3D design so kids
8 could print -- make objects that could print on a 3D
9 printer. And we didn't really like the software that
10 was out there that we could use to teach in so we wrote
11 our own software and spun that off as a separate
12 company. And that was called BlocksCAD.

13 And BlocksCAD is more educational but very
14 easy-to-use computer-aided design software that kids
15 can -- well, we taught at our facility and then kids
16 could use it to make 3D designs that they could print on
17 a 3D printer.

18 And that got spun out. We -- we raised some,
19 you know, external money. We got -- became part of
20 several incubator programs, and -- and -- yeah, and so
21 that was BlocksCAD.

22 And I think that is -- that is -- that's
23 pretty much where my CV leaves off.

24 Q. Thank you for that. That was very
25 comprehensive.

1 Dr. Houh, let me start from BlocksCAD where it
2 states on your CV that you have been working from 2014
3 to present.

4 Is that accurate, first of all?

5 A. Well, I wasn't -- at the beginning, I was more
6 hands on. But at some point when we spun out the
7 company, we transitioned to -- I transitioned to the
8 board and so I'm not day-to-day active at that company.

9 Q. Have you spent any time designing network
10 switches while at BlocksCAD?

11 A. No.

12 Q. Have you spent any time designing network
13 routers while at BlocksCAD?

14 A. No.

15 Q. Have you spent any time designing multiplexers
16 while at BlocksCAD?

17 A. Sorry, I didn't hear that last word. I
18 didn't --

19 Q. Have you spent any time designing multiplexers
20 while at BlocksCAD?

21 A. No.

22 Q. What about demultiplexers?

23 A. No.

24 Q. Would it be fair if I referred to network
25 routers, switches, multiplexers, and demultiplexers as

1 network devices for purposes of talking about your
2 resume?

3 A. Sure.

4 Q. Thank you.

5 So from 2009 to 2022 you worked at H3XL, Inc.
6 doing business as Einstein's Workshop, right?

7 A. I'm -- I'm -- I don't -- I don't remember the
8 dates you said, but my CV says 2009 to 2022.

9 Q. During that time frame while working for H3XL
10 did you spend any time designing network devices?

11 A. Not designing the devices themselves, but at
12 that company, I -- I configured and set up all the
13 networking tools initially, all the routers, all the
14 firewalls, all the switches, the -- I set up the whole
15 network there.

16 Q. When you configured those devices, you weren't
17 actually responsible for designing their internal
18 components. Correct?

19 A. No, we -- we bought those. We just bought
20 off-the-shelf equipment.

21 Q. And did you tear any of those devices down
22 during your work at H3XL?

23 A. No.

24 Q. Then around the same time, around 2009 through
25 present, you have been working at Houh Consulting as an

1 independent consultant there?

2 A. Yes.

3 Q. And during that time, you've worked with a
4 number of different law firms, right?

5 A. Yes.

6 Q. And you've offered services as a technical
7 consultant?

8 A. Yes.

9 Q. And that was in connection with patent
10 litigation?

11 A. Generally, yes. They --

12 Q. And -- sorry. Please go ahead.

13 A. I -- I'm sorry, I just added "they are" at the
14 end.

15 Q. And what percentage of your income would you
16 say was derived from your work as a technical consultant
17 advising on patent litigation during that time frame?

18 ATTORNEY CLEMENTS: Objection. Relevance.

19 A. You -- you're saying during the time frame
20 2009 to present?

21 BY ATTORNEY STAMATOPOULOS:

22 Q. Correct.

23 A. I -- I -- I mean, I -- I would probably
24 estimate at that time that -- in terms of the revenue
25 from all my businesses together that the technical

1 consulting was around probably a little over 50 percent
2 is a rough estimate. 50 to 60 percent, probably.

3 Q. Okay. Between 2008 and 2009, you worked at
4 Eons as chief technology officer?

5 A. Yes.

6 Q. Did you design any network devices as part of
7 your duties as chief technology officer at Eons?

8 A. No.

9 Q. Did you do any tear-downs of network devices
10 while at Eons?

11 A. No.

12 Q. Sorry, sir, that was -- that was a no?

13 A. That was a no.

14 Q. And other than chief technology officer, did
15 you hold any other titles at Eons?

16 A. No.

17 Q. And from -- you mentioned earlier that you
18 worked at a company called BBN, right?

19 A. Yes.

20 Q. While at BBN did you design any network
21 devices?

22 A. No, I did not there, but I did work with a
23 number of projects that -- that were networking-focused.

24 Q. But again, you didn't design any network
25 devices. Correct?

1 A. Not while I was at BBN.

2 Q. And while you were at BBN did you tear down
3 any network devices?

4 A. No.

5 Q. And you said -- when I asked you earlier if
6 you designed any network devices while at BBN, you said
7 no, not at BBN.

8 Did you design any network devices at any
9 other point in time in your career?

10 A. Yes.

11 Q. When did you design network devices?

12 A. So as part of my work for my research
13 assistantship that I had while I was pursuing my Ph.D.,
14 our group, and I helped, so we -- we designed a whole
15 gigabit network from scratch. Well, from -- from
16 components and chips and whatnot. So I helped design
17 the switches that -- that we eventually built and used
18 for our network. I designed the -- the links between
19 the switches. I designed the network interface cards,
20 and I wrote a lot of the software to manage the
21 connections on the links.

22 And I -- I wrote the -- the -- all the
23 software for the network interface cards that integrated
24 with the operating system.

25 I also worked with a student there. I was

1 kind of the primary grad student working with him, and
2 he built -- he built a module for what he called at the
3 time striping, which was to use multiple links to gang
4 multiple links together to -- to achieve higher
5 bandwidth between two points. So I worked with him as
6 a, you know, a more senior grad student on the team
7 on -- on, you know, helping -- helping advise him on
8 that project.

9 Q. And okay, thank you for that.

10 Other than your work as a research assistant
11 at MIT did you at any other point in time in your career
12 design network devices?

13 A. Yes. At -- at Empirix, I -- I created a -- a
14 new product platform called Packet Sphere. And that was
15 based on -- around technology that was somewhat new at
16 the time called a network processor.

17 So -- so I -- we built -- we designed and
18 built the hardware, and we designed and built the
19 software for that. And -- and it was to be used for
20 data network testing. That was the intended use of the
21 product. So we did -- I did help -- I did really design
22 that. And I think I got a patent on the use of network
23 processors for -- for testing equipment, or -- it's -- I
24 think it's listed somewhere in my CV. So at that time,
25 I did design and build this equipment.

1 I mean, of course, we -- we -- I had a team of
2 people as well, but I kind of -- I led -- I was the
3 engineering manager for that project.

4 Q. You were at Teradyne between 1999 to 2004?

5 A. Well, it wasn't called Teradyne that whole
6 time. Part of it then it was spun out. So I started
7 when I was at Teradyne, and then after it spun out, that
8 became Empirix.

9 Q. And what was the time frame in which you
10 worked at Empirix again?

11 A. Well, I mean, I joined Teradyne in 1999.
12 In -- in 2000, Empirix was spun out in January of 2000,
13 and then I continued through some point in 2004.

14 Q. And when would you say it was that you helped
15 design a network processor?

16 A. I -- I didn't design the network processor
17 itself. I -- we used -- we used a network processor
18 we -- we bought from a company called C-Port, which
19 eventually got bought by I think Motorola. So we
20 designed the product around the network processor, and
21 that was around 2000 to 2001.

22 Q. So you didn't design the network processor.
23 That was out of the box. Correct?

24 A. That's right. The network processor we -- we
25 simply bought from another company. We designed a

1 product around the network processor.

2 Q. What was this product?

3 A. That was the Packet Sphere platform that --
4 that I mentioned earlier.

5 Q. And can you describe to me the Packet Sphere
6 platform?

7 A. Sure. The idea behind it was that it was a
8 flexible and programmable test tool so that first of
9 all, it had a chassis. And then you could purchase --
10 you -- we -- we -- so we designed the chassis and then
11 we -- we designed cards for the chassis that plugged in
12 that you could -- I don't remember how many cards you
13 could -- the chassis could hold. Maybe four, five, six,
14 around -- around there. And you could buy our -- our
15 networking card that plugged in that -- and the -- the
16 network processor was -- would have been on the card,
17 and there would have been output ports.

18 I don't remember what configurations we had
19 of -- of, you know, what the ports were, but -- I
20 don't -- I don't remember the exact details now, but the
21 idea was that you would -- the -- the cards, because
22 they were based around the network processor, which
23 would -- which allowed high-speed process packet --
24 per-packet processing to occur at wire rates on -- on
25 the network that we could do things like -- and this was

1 the vision, which was we could test data networks with
2 it. We could generate lots of traffic.

3 One of the other products that Empirix had
4 that I worked in with some point at my tenure at Empirix
5 was for web testing, and they could generate a load, web
6 traffic load against websites and then analyze the
7 results of the -- of the, you know, web, you know, the
8 web emulating a bunch of web users.

9 And the idea eventually was we could generate
10 the same traffic at a much higher level with -- with
11 this hardware, this network processing hardware. And
12 that was the idea there.

13 So -- so I had planned out a number of
14 different applications that could run on the -- on the
15 platform where we would reprogram the network processor
16 and the rest of the software. Well, basically run a
17 different application.

18 One was -- one was for just being a protocol
19 analyzer to capture data at high rates and analyze
20 the -- the -- the contents of the packets and decode
21 them for the user.

22 Another was to act as a cloud emulator that
23 would emulate the behavior of -- of the internet over
24 long distances in the lab, since it's hard to get, for
25 example, you know, thousands of miles of optical fiber

1 and a whole bunch of intermediate router nodes and set
2 them up in a lab.

3 Instead, the application would emulate the
4 delay and -- and other network problems like, you know,
5 packet loss and jitter and reordering and things like
6 that that would occur in a -- in a real network so -- so
7 people could test their applications like voice over IP
8 or streaming audio or video in their lab.

9 Another application we envisioned was just
10 generating, you know, gobs of -- of traffic in various
11 protocols for, for example, a lot of TCP traffic or a
12 lot of IP traffic. And so that was the idea behind that
13 platform.

14 Q. Thank you for that.

15 Now, Dr. Houh, you mentioned that you actually
16 received a patent for the work you did at Empirix.
17 Correct?

18 A. I think there were several patents that I
19 received, but one based on that. At least one based on
20 that project, I think.

21 Q. And in preparing your declaration, you did not
22 identify any of those patents as prior art to the '740
23 patent. Correct?

24 A. I -- I -- that's correct.

25 Q. Now, we have been talking about a network

1 processor quite a bit.

2 What is a network processor, Dr. Houh?

3 A. Well, the network processor that -- that we
4 used at that time was a -- designed to operate at wire
5 rates. At -- at the time, that would have been around
6 about a -- a gigabit to be able to process packets over
7 a -- a number of different ports at -- at the wire rate
8 and apply more instructions to each packet than was
9 typical in the networking chips at the time.

10 And -- and that -- and that we could go in and
11 actually write programs that we could load onto the
12 network processor to do the kinds of things for the
13 applications that I described, but do them at -- at wire
14 rates on the network processor.

15 Now, I don't remember the full bandwidth that
16 that network processor supported. It could have been
17 around 10 gig at the time. But again, I don't remember
18 that offhand now.

19 Q. You mentioned a network processor processed
20 packets that were directed to ports.

21 Did I get that right?

22 A. Yes. The -- the cards would have had multiple
23 ports, or -- I don't remember how many and in what
24 configuration we had.

25 There were probably cards with 100-megabit

1 ports or -- and/or gigabit, and -- or some combination
2 of 100-megabit or -gigabit ports. Or they might have
3 just been, you know, here's a 100-megabit card, here's a
4 gigabit card. And I don't remember how many ports each
5 card would have had.

6 Q. And the processor would determine which ports
7 the packets would be directed to?

8 A. I mean, you know, with the right application,
9 the -- the network processor could have routed the
10 packets and -- but we were -- a lot of the applications,
11 we were either a pass-through or -- or an end point.

12 So the idea is if you were a -- if we were
13 generating traffic, we'd be generating traffic as an end
14 point. For the -- for the -- the cloud emulator that I
15 described that -- that could emulate the behavior of --
16 of a wide area network, it was just configured to -- to,
17 you know, one -- one -- with one -- one specific port as
18 an input or one side of that cloud emulator and
19 another -- another port as the other side of the cloud
20 emulator.

21 But -- but, I mean, the chip was designed.
22 You know, one of its main goals, as I understood it, was
23 for use in a -- in a network device such as a router
24 where it could route -- it would route packets. It had
25 all those sorts of -- of -- of high operations that

1 would be used to create a router built into the -- the
2 processor.

3 Q. When you say the chip had the goal of routing
4 packets, you mean that the network processor would
5 determine a port through which packets would travel?

6 A. Yeah. I mean, if it received a -- a packet on
7 one port, it -- one of its -- it might have been --
8 well, it -- basic standard software that came with the
9 network processor, I think, that would then, you know,
10 for example, consult a routing table to determine which
11 output port the -- the packet should be routed to.

12 It probably had that -- that level of -- of --
13 of software that the -- that the network processor's
14 company had developed, and for both maybe ethernet layer
15 and IP layer, for example.

16 I mean, that -- that was the point was so
17 that -- that the processor could do all this -- all
18 these types of -- of operations at wire speed.

19 Q. Is that a -- was that a standard function of a
20 network processor over the, let's say, 2000 to 2004 time
21 frame?

22 A. Well, I -- I don't really know what you mean
23 by standard. But, I mean, that was part of -- from what
24 I understand it, the company that made the network
25 processor, that was one of its target areas for, you

1 know, where it was aiming to -- that -- to -- to go
2 after in their design and release of the product, which
3 was to go into standard networking equipment and perform
4 not only those functions, but the processor would have a
5 lot of overhead so that the -- the -- the devices could
6 perform additional functions. Maybe, you know -- you
7 know, things like analysis or, you know, deep packet
8 inspection to -- to -- to work in a firewall situation,
9 for example.

10 Q. But anyway, this is one of the things that the
11 network processor that you worked with was designed to
12 do. Correct?

13 A. I believe it was, yes. But we took the
14 network processor to use in -- in the test space, and so
15 we used the, you know, core high-speed instructions to
16 design testing applications for a data network.

17 And in -- in -- in that, we gained the
18 flexibility of the fact that it was -- you could load
19 the software onto the network processor and change the
20 kind of application that's running from -- from -- you
21 know, I -- you could load the routing software on it.
22 It would -- and so it would act just as a -- a standard
23 router.

24 But we loaded our -- our specific software we
25 developed on our own so it would become a cloud

1 emulator, for example.

2 Q. Is the word -- let me withdraw that.

3 Is the term "network processor" a term of art?

4 A. I mean, I think it -- it -- it has some
5 meaning. I'm -- I'm not sure how embedded. I -- I
6 think at the time we -- we built that product, that was
7 kind of a -- around the time maybe that term was -- was
8 being used for the first time, at least based on my
9 recollection.

10 Q. So it had a commonly understood meaning?

11 A. Well, I'd have to think about what --

12 ATTORNEY CLEMENTS: Form.

13 A. -- it was, or, you know -- you know, at the
14 beginning, when people use a word, they may use it in a
15 lot of different ways. I'm not sure when it became more
16 commonly understood.

17 But, I mean, I think people understood that
18 when you said "network processor," the idea wasn't to
19 like -- it wasn't to go in a general purpose computer
20 and run Microsoft Word. It was to process -- one of the
21 goals would have been to process packets at -- at --
22 well, as fast as it could, or -- or achieve wire rate
23 processing for packets.

24 BY ATTORNEY STAMATOPOULOS:

25 Q. And just to be clear, the processing for

1 packets refers to the operation performed by the
2 processor to route the packets to different ports?

3 A. Well, that's an example of one of the -- of
4 the functions, but it -- but the -- the -- the
5 particular network processor that we chose to use in our
6 test system could do that, but also with a lot of
7 overhead per packet so that you weren't limited to only
8 doing that, that operation, so that you had spare
9 computation cycles that you could do for other purposes.

10 And -- and we -- we -- we used that, for
11 example, in the cloud emulator we built to apply these
12 other functions to packets passing through the system
13 and -- and make it behave -- you know, I mean, the idea
14 was that you could -- in that product, is you could dial
15 in a loss rate. Like, let's lose one in -- you know,
16 about, on average, one in 1,000 packets, or one in
17 10,000 packets, or one in 100 packets and see what
18 happens to the applications that are running through
19 there.

20 And I would say that's a very unconventional
21 use of a network processor, because if you are doing a
22 router, you don't want to lose packets. I mean, you
23 could drop packets if you're congested, but you hope to
24 not be so congested you need to drop packets.

25 But the idea of the network emulator is that

1 you would force some packet loss in -- in certain ways,
2 like bursts of packets over a -- a brief period, or
3 randomly, random loss of packets.

4 So -- so we used the same instructions, the
5 core instructions that the network processor made
6 available, and we used them in -- in the ways for
7 testing as opposed to routing.

8 Q. Understood.

9 So you mentioned you designed network devices
10 at Empirix, and you designed network devices, or you
11 helped design network devices when you were a research
12 assistant at MIT. Correct?

13 A. Yes.

14 Q. Any other instances in which you helped design
15 network devices?

16 A. I don't think so, no.

17 Q. And your tenure as a research assistant at MIT
18 was between 1991 and 1998?

19 A. Yes.

20 Q. And you -- I believe you testified earlier --
21 please feel free to correct me if I'm wrong or
22 misstating your testimony -- that you designed a whole
23 gigabit network from scratch when you were at MIT as a
24 research assistant.

25 A. Well, our group did that. I didn't do that

1 all myself. So again, I helped design the switches, and
2 I -- but I did design all by myself the links and the --
3 and the network interface cards for the computers and
4 the associated software that went along with -- with
5 those devices to manage and configure the -- the -- the
6 routing tables in the -- in the link, for example.

7 Q. What's a routing table?

8 A. Well, when we received incoming cells on a
9 particular port, the switch needs to know how to figure
10 out to which output port the packet should be
11 transmitted.

12 So I designed the protocol that -- that --
13 that the control -- a separate control processor would
14 use to set up those connections and interact with the
15 links to update the routing tables in the links. Sorry,
16 in the switches.

17 Q. What is a link?

18 A. A link would be a device that connects one
19 port of one switch to another port of a different
20 switch, so -- and then we could -- I -- the ones I
21 designed were based on fiberoptic cables so that you
22 could plug in the link card, it'd run, you know, at a
23 high speed, and then you'd -- you'd run cables to
24 another -- another card.

25 And we both had internal links, and we were

1 actually able to interconnect with a SONET link to
2 get -- we -- we had -- this -- this -- this was -- this
3 whole project was done as part of the AURORA Gigabit
4 Testbed. DARPA had funded a number of testbeds, I think
5 on the order of five to seven, around the country.

6 We were part of it with one effort along with
7 I think UPenn, IBM, Bellcore. And we had I think a
8 switch at UPenn, another switch at UPenn. Maybe at
9 Bellcore or IBM, I don't remember which, if one or both
10 of those companies had our switches. And we -- we had a
11 high-speed SONET link between various points with those
12 points and so we would interconnect with the SONET
13 devices as well.

14 Q. Is it fair to say that a link is simply a
15 connection between two end points?

16 A. I -- sure. I think that -- that some people
17 that -- that -- you know, at a -- at a high level, I
18 think that's fair.

19 Q. And there's several types of links. Correct?

20 A. Well, I -- I -- I think there are various
21 protocols that links can use, if that's what you mean.

22 Q. Well, let me ask it a little bit differently.
23 There's a thing -- there's such a thing as a
24 physical link. Correct?

25 A. Oh, sure. Yes.

1 Q. And then there's such a thing as a logical
2 link, right?

3 A. Sure.

4 Q. And a logical link is a type of connection
5 that may include a number of different physical links.
6 Fair?

7 A. Yes, that's fair. And I think the -- the --
8 the connection setup that -- that I used on the routing
9 cable created a -- a virtual mesh across our network
10 between all the different end points.

11 And -- and those -- those were the logical
12 links, but they traversed various physical links. And
13 part of the -- what I had to do to -- to write the
14 software to that is figure out all the physical link
15 mappings to virtual links and -- and program them, send
16 the right instructions to the various switches to update
17 the routing tables appropriately.

18 Q. And a logical link may include a number of
19 different physical links that are arranged in series.
20 Correct?

21 A. Sure. That -- that -- that's possible, yes.
22 It -- it could be -- it could have just been one, but
23 there could have been multiple links for -- for a -- for
24 a virtual link. Multiple physical links. I mean one or
25 more, or --

1 Q. And is it --

2 A. Or -- or actually, in our case, zero or more
3 because you could be talking to another device on the
4 same switch, in -- in which case there's no link that it
5 would traverse. So it would be zero or more links for
6 our -- our virtual connections.

7 Q. Sorry, you said that if you're talking to
8 another device on the same switch, there may be zero
9 links?

10 A. Right. That's right, that -- that -- that the
11 packet would traverse to get to the other device you're
12 talking to.

13 Q. And you could also design a device where the
14 internal components are connected by different physical
15 links. Correct?

16 A. Sorry, could you ask that question again?

17 Q. You mentioned earlier that if you have two
18 components on the same device, there might actually be
19 zero physical links that connect those two devices.

20 Fair?

21 A. Yeah, the device being the switch. So if I
22 was trying to talk to another computer connected to the
23 same switch that I'm connected to -- and that was
24 possible. I think we have that situation -- then
25 there'd still be a virtual connection, but it would just

1 be across the one switch and not go through any links.

2 Q. But you could also have a particular device,
3 like a switch, in which different components talk to one
4 another over physical links. Correct?

5 A. Well, I mean, if we had one switch in one room
6 or site and -- and another switch in a different room,
7 different room or site, then those switches would be --
8 would have been interconnected with the links that I
9 designed. And then in that case, the components of
10 the -- of the switch would -- would be transmitting over
11 a link to get -- get a -- get a cell over to the other
12 switch.

13 Q. Now, what does it mean for physical links to
14 be arranged in series?

15 A. So you're -- you're distinguishing kind of
16 series versus parallel. So in series would mean that --
17 that I might go through -- a packet might, you know, if
18 I'm going to a -- a different -- well, if I'm going
19 through a number of hops, there would be a link for one
20 hop in series for the link with the subsequent hop in
21 series with a link for any subsequent hops after that.

22 And so in that case, a single packet would go
23 through a series of separate links, but each -- at each
24 point, the idea of networking is you're getting a little
25 closer to your destination.

1 So to -- when there are multiple links between
2 you and the destination, in-series links would be, for
3 example, the various links that you -- you traverse one
4 at a time subsequent to each other to get to the -- for
5 the packet or cell to get to the destination.

6 Q. Let's say I had a single hop connected through
7 a single logical link. Would it be possible for that
8 logical link to consist of two physical links that are
9 arranged in series?

10 ATTORNEY CLEMENTS: Objection. Form.

11 A. In -- sure. In many cases, that generally
12 is -- is possible. And -- and, I mean, that's certainly
13 what we did in -- in the case of -- of Sony, the go
14 through toolings. I'd set up the network appropriately
15 to go from -- you know, through multiple links, or -- or
16 we'd say multiple hops, to get to the destination in --
17 in --

18 BY ATTORNEY STAMATOPOULOS:

19 Q. If two links are -- if two physical links --
20 let me withdraw that question.

21 If two physical links are connected in series
22 and are sequential, would then those two physical links
23 have a common end point?

24 ATTORNEY CLEMENTS: Objection. Form.

25 A. Well, I mean, at -- at -- at one point in the

1 network, for example, the two physical links would --
2 would be links that -- that -- that shared a node. It
3 wouldn't necessarily be the same port on the node, but
4 it might be the same, you know, device that both links
5 are interconnected to that -- that -- and -- and -- and
6 I think that's what -- people think of how many nodes do
7 you go through as -- as the hops are -- alternatively,
8 there's a relationship between how many links and how
9 many nodes, if -- if you're talking at the physical
10 level.

11 But obviously, if there's not a connection --
12 if -- if there's two separate, distinct networks, you
13 can't -- they're not -- they're -- they're not
14 interconnected and there's no way to get to them. But
15 then you can't get from one end point to another.

16 So when you have a series of links for traffic
17 to traverse, there are common nodes that -- that two
18 links may interconnect to, but it wouldn't -- it would
19 typically be the different ports on that node. And it
20 wouldn't necessarily share the same port hardware, but
21 they'd -- they'd be connected to the same router or
22 switch, for example --

23 Q. Could they be connected --

24 A. -- so --

25 Q. Could they be connected to the same

1 multiplexer?

2 ATTORNEY CLEMENTS: Objection. Form.

3 A. So, you know, if -- if -- if -- for example,
4 like, some switches have, you know, high-speed ports
5 that -- that can -- can be broken out into slower --
6 slower speed ports. For example, that -- that -- that
7 might be a form of -- of multiplexing that might be
8 interconnected to the same port ultimately on a -- on a
9 switch.

10 They -- they could be connected to the same
11 multiplexer or port in -- in that case, but the same --
12 like, the physical port, like the -- if it's
13 fiberoptics, like where you plug in the fiberoptic
14 cable, those would -- would typically be different.

15 BY ATTORNEY STAMATOPOULOS:

16 Q. Could a multiplexer be an end point for a
17 physical link?

18 ATTORNEY CLEMENTS: Objection. Form.

19 A. Well, I mean, you know, I -- I think it
20 depends what the context is of what you mean by an end
21 point, you know. You -- what -- what -- you'd have to
22 terminate the physical connection somehow and then
23 interconnect with some other device. And whether you
24 consider the termination the end point or the other
25 device just depends on how you're talking about the

1 various parts of the system, I think.

2 BY ATTORNEY STAMATOPOULOS:

3 Q. So what the end point is for a physical link
4 depends on the context in which that physical link is
5 used.

6 Is that fair?

7 A. That's not exactly what I said. It -- I'd --
8 I'd have to understand the context to understand. But
9 again, a link -- you know, you have to have some sort of
10 receiver for -- you know, if the -- the link is optical
11 and you have some sort of optical receiver, that -- that
12 ultimately, the -- the -- the end of the physical
13 optical cable plugs into. And in some -- some
14 situations, you might call that the end point.

15 But then, you know, the -- the -- the data,
16 you know, is recovered by the receiver into some digital
17 form and then transmitted into a multiplexer or a
18 switch. Maybe it's directly connected to a port on a
19 switch through some hardware, and -- but -- but for --
20 if you're -- if you're talking about routing packets
21 through the network, you don't really think of the --
22 the -- the routers as end points of -- of -- of the
23 communications, which -- which may have end points
24 specified at a higher level. Like, an IP packet
25 communication, if you are talking about the end points

1 for an IP communication are typically, you know, not
2 a -- are -- would -- would typically be considered
3 the -- the -- the end device identified by -- by the
4 addresses in the IP packet.

5 But all those packets pass through a router.
6 They pass through a receiver. They are received by a
7 receiving thing there, and -- but for the IP layer
8 communications you wouldn't consider any of these
9 intermediate things the device, the -- the information
10 passes through to be the end point of the communication.
11 So it -- it does depend a little on what context you're
12 talking about, what -- you know. But if you're -- if
13 you're talking about like terminating a -- you know,
14 optical, you know, bits, you know, you might talk about
15 that receiver or the -- the hardware that that's
16 connected to.

17 But if you're talking about -- like, in --
18 in -- like in our network, we -- we -- in our network,
19 when -- we have various IP packets between various work
20 stations. And regardless how many switches and links it
21 went through, you still think of the end point of that
22 communication as the -- the computers identified by
23 the -- the IP protocol when you send the packet as the
24 end points of that layer of communications.

25 And it's because communications can be layered

1 up and -- and -- and abstracted from below. Or, well,
2 the lower layers are abstracted from higher layers, so
3 if -- so if you have a virtual connection, you know,
4 through a network, you -- you don't really think about
5 any of the intermediate points as end points of the high
6 layer of communication that you're using the virtual
7 connections for.

8 Q. Is a backplane trace a physical link?

9 A. Well, in the sense that they interconnect, you
10 know, generally speaking. Like for the -- the system we
11 built, the Packet Sphere product, we had a backplane,
12 and we had communications over the backplane. And --
13 and in the sense that you could talk from one card in
14 one slot to another card in a different slot, the
15 backplane allowed for connection -- a -- a --
16 communicating traffic between the appropriate slots.

17 Q. And a physical link has end points. Correct?

18 A. I -- I mean, at that layer, if you are talking
19 about -- about the -- the communications at various
20 layers. I mean, are you referring to anything in -- in
21 the -- in the --

22 Q. Let me ask it in very simple terms.

23 A physical link starts somewhere. Correct?

24 A. Sure. I don't think I'd dispute that. There
25 has to be some -- if you're, you know, sending

1 something, it starts from somewhere.

2 Q. And a physical link ends somewhere. Correct?

3 A. Well, I mean, there are things that -- that,
4 like -- like the -- the old ethernet technology, you
5 know. The -- the physical wire may have end points and
6 even tabs that you might consider additional end points.
7 But I'm not sure if you are referring to the actual --
8 like, a trace on a backplane you might think has end
9 points at the far extreme edges of the backplane, and it
10 has -- has tabs at -- at points with, you know --

11 Q. I -- I don't mean to cut you off. I'm --
12 maybe -- you know, I'm not sure what the best --

13 ATTORNEY STAMATOPOULOS: Should we go on a
14 brief break? I think it's -- we have been going for
15 about an hour plus. Is that -- would you like to go on
16 a break, Dr. Houh? Counsel?

17 THE WITNESS: No.

18 ATTORNEY STAMATOPOULOS: No? You want to --

19 THE WITNESS: Sure. Sure, we can do a break.

20 ATTORNEY STAMATOPOULOS: Let's do a quick
21 break.

22 (Recess taken.)

23 BY ATTORNEY STAMATOPOULOS:

24 Q. Welcome back, Dr. Houh.

25 A. Thank you.

1 Q. So you mentioned that earlier when you were --
2 let me withdraw that.

3 You testified earlier that as part of your
4 work as a research assistant at MIT you helped design a
5 gigabit network. Correct?

6 A. Yes.

7 Q. And part of that network included network
8 interface cards.

9 Is that fair?

10 A. Well, I mean, that's how computers interface
11 to the network. But yes, I did design the network
12 interface cards.

13 Q. And you designed those cards yourself?

14 A. Yes.

15 Q. What is a network interface card?

16 A. It would -- in our system, it was the card
17 that allowed the computers to interconnect with the
18 network. And I think that's generally what people think
19 of as network interface cards as well.

20 Q. And what is -- at a high level, what does a
21 network interface card do?

22 A. Well, the -- the card itself, like, plugged
23 into the bus of a -- of a -- in our case, it was a
24 work -- it was a deck workstation. So it plugged into
25 the workstation bus. So there's some electrical and

1 digital kind of interface on the -- on the interface to
2 the computer side.

3 And then it plugged into, in our case, a --
4 directly into a switch as -- in one of the ports of the
5 switches that we designed, so that was the other side.

6 So -- so that allows basically to convert
7 between the protocol used in the switch and the protocol
8 used in the computer in terms of the electrical
9 interface and -- and -- and those types of things.

10 Q. Is a network -- and by the way, if I -- if
11 I -- we're on Zoom, so if I do cut you off, please let
12 me know and I'll let you finish your -- your answer.
13 It's not intentional.

14 Is a network interface card the same as a line
15 card?

16 ATTORNEY CLEMENTS: Objection. Form.

17 A. Well, in -- in -- in some -- some systems, I
18 think, like if you are looking at a telephone system,
19 you might -- you might have line cards plugged into the
20 switch that a whole number of -- of different, you know,
21 telephone lines terminate, for example.

22 So in -- in our system, we -- I mean, that --
23 that -- that is -- it's an interface. But I think at
24 least the network interface cards that -- that are, I
25 think, available for computers are more on the -- on the

1 computer side as opposed to on the switch side.

2 BY ATTORNEY STAMATOPOULOS:

3 Q. And a line card would be a card that is used
4 as part of a switch. Correct?

5 A. That -- I -- I've seen line cards that are
6 used -- like, an example of a line card might be
7 something that connects to a switch port that breaks out
8 that interface into other interfaces, typically slower,
9 that a customer equipment could then -- could then be
10 plugged into, for example.

11 Q. Do line cards typically include multiplexers?

12 A. I mean, the idea would -- would be to take
13 multiple customer-facing ports or connections and --
14 and -- and get them into the switch. So, I mean, a
15 multiplexer is -- is one form of thing that could be
16 used to do that.

17 Q. What else could you use to do that?

18 ATTORNEY CLEMENTS: Objection. Form.

19 A. You could use a -- a -- a -- some sort of
20 queueing model that -- that wasn't a digital multiplexer
21 but was -- was a -- was -- had -- would have a different
22 form but provided a function of allowing multiple inputs
23 to go to one shared output, or -- and vice versa, or
24 vice versa if you're talking about demultiplexers too.

25 Q. Do multiplexers allow multiple inputs to go to

1 multiple outputs?

2 A. I mean, if you have like an 8-bit multiplexer,
3 there might be, you know, 8 input bits per port and 8
4 output bits. So in that -- in that sense, that's an
5 example of -- of a situation where -- where there are
6 multiple input bits and multiple output bits.

7 Q. Do you discuss any such examples in your
8 declaration, Dr. Houh?

9 A. I mean, I don't see what I was just discussing
10 being discussed in my declaration in the -- in the
11 section on multiplexing and demultiplexing.

12 Q. So you haven't discussed any examples of
13 multiplexers that would connect multiple inputs to
14 multiple outputs. Correct?

15 A. I think in -- in my declaration, that section
16 that I was just looking at is talking about kind of one
17 put -- one-bit output as opposed to, you know, say, an
18 8 -- 8-bit integrated multiplexer that had 8 output
19 bits, was kind of byte-wide multiplexing. But the ones
20 in the declaration -- in my declaration in this section
21 I was looking at starting on page 11 are focused on kind
22 of one-bit outputs.

23 Q. To be clear, when you say "one-bit outputs,"
24 that means there may be multiple inputs but there can
25 only be one output. Correct?

1 A. Right. For a multiplexer, there -- there are
2 multiple inputs that can be multiplexed onto one output
3 bit.

4 Q. And just to be clear, there are multiplexers
5 that perform a different function in that they associate
6 multiple inputs to multiple outputs. Correct?

7 A. Well, I -- I'm -- I mean, I -- what I was
8 talking about was -- was, for example, an input isn't
9 just one bit. It's a byte. So there might be multiple
10 byte inputs in one byte output that is 8 bits wide, you
11 know, so -- so that -- it's effectively like -- yeah, I
12 mean, you asked if there were multiple outputs, and I --
13 that's what the answer I gave is, which is multiplexing,
14 it -- you could have -- you -- you'd have a multiplexer
15 device that takes, you know, say, 16 inputs of 8 bits
16 per input and multiplexes 16 different 8-bit inputs onto
17 one 8-bit output, for example.

18 Q. Let me ask a slightly different question.
19 So the multiplexers that you discuss in your
20 declaration, they have multiple input lines. Correct?

21 A. Yeah, some of the examples surely have
22 multiple input lines.

23 Q. But there is no example discussed in your
24 declaration in which a multiplexer that has multiple
25 input lines also has multiple output lines. Correct?

1 A. I mean, at least in this section I'm looking
2 at in -- starting at page 11, I don't -- I don't see any
3 discussion of an example with multiple output lines for
4 a multiplexer.

5 Q. But you are aware of devices outside of the
6 context of your declaration based on your own experience
7 where multiple input lines will be connected to multiple
8 output lines via a multiplexer. Correct?

9 A. Sure. The example I gave is where it's --
10 it's multiple bits wide. The -- the inputs are -- are
11 not just one bit but maybe 2 to -- 2, 3, 4, 8 bits each
12 wide. And the output is similarly the same width as
13 each of the inputs, for example. I think that's an
14 example.

15 Q. A backplane trace could terminate at a
16 multiplexer. Correct?

17 A. I mean, you can design in hardware whatever
18 you want to design.

19 Q. And I'll ask my question again.

20 A backplane trace could terminate at a
21 multiplexer. Correct?

22 A. I -- I mean -- I mean, that's -- that's kind
23 of a rather abstract question with respect to, I mean, a
24 trace and a termination so I'm not really exactly sure
25 what you're getting at with that question.

1 Q. Let's go to page 17 of your declaration.

2 A. Okay.

3 Q. There's a figure, Figure 2.

4 A. Yes.

5 Q. That figure's from the '740 patent, right?

6 A. That's what it's labeled, yes.

7 Q. And on that figure there is something referred
8 to as a network element labeled 32. Correct?

9 A. I see that.

10 Q. And within that network element 32 there are a
11 number of line cards labeled 40. Correct?

12 A. Yes, I see that.

13 Q. And let's take the first of those line cards,
14 line card 1.

15 Do you see that?

16 A. Yes.

17 Q. There are several line cards that start with
18 the number 1 and end in N. Correct?

19 A. Yes.

20 Q. The first line card is connected to a number
21 of lines shown in Figure 2 on the right-hand side of the
22 line card.

23 Do you see that?

24 A. Yes.

25 Q. Those lines represent backplane traces.

1 Correct?

2 A. If you look at the -- the specification of the
3 '740, the -- the items labeled 56 are often described
4 as -- as backplane traces.

5 Q. Okay. You can also look at your declaration
6 at Paragraph 25, which is right under the figure I was
7 pointing to, where you state: The interface modules are
8 connected to the communication network 28 using
9 backplane traces 56.

10 Do you see that?

11 A. That's what I say, yes.

12 Q. Okay, great.

13 Now, these backplane traces 56 on the
14 left-hand side connect to different line cards, right?

15 A. Yes, yeah, the -- the 56, yes.

16 Q. And different sets of backplane traces connect
17 to different line cards. Correct?

18 A. In this example figure, that's -- that's
19 what's shown.

20 Q. Okay. I want to direct your attention to the
21 very top set of backplane traces that are connected to
22 line card 1.

23 Do you see that?

24 A. Yes.

25 Q. And what's shown here on Figure 2 is four

1 backplane traces that are connected to line card 1.

2 Do you see that?

3 A. Yes.

4 Q. And those four backplane traces are connected
5 also to a different component in network element 32 that
6 is labeled 44 and referred to as MUX.

7 Do you see that?

8 A. Yes.

9 Q. Is that component a multiplexer, in your
10 understanding?

11 A. The specification does indicate that 44 is a
12 multiplexer. And MUX is -- is the standard abbreviation
13 I've seen used before.

14 Q. Now, let me ask you this, Dr. Houh.

15 This top group of backplane traces that
16 connect on the one hand to line card 1 and on the other
17 hand to MUX 44, is this set of backplane traces arranged
18 in parallel?

19 A. I mean, certainly the figure suggests that
20 these are -- are parallel traces.

21 Q. What in the figure suggests to you that these
22 are parallel traces?

23 A. Well, there are four separate lines, and
24 they're -- they're -- they're parallel lines as drawn
25 on -- in the figure.

1 Q. And the fact that they're parallel lines as
2 drawn would lead you to believe that these are parallel
3 traces. Correct?

4 A. I mean, coupled with the context of the
5 specification, I mean, I -- I think, you know, the
6 figures are read and described to the -- the POSITA
7 reviewing the patent.

8 Q. Does the fact that these four backplane traces
9 all start at the same line card and end at the same
10 multiplexer also suggest that these are parallel
11 backplane traces?

12 A. I think it's certainly consistent with things
13 that are described in the -- in the specification as
14 well.

15 Q. If these backplane traces had different
16 starting and ending points, would that suggest to you
17 that they are parallel traces?

18 ATTORNEY CLEMENTS: Objection. Form.

19 A. I don't think that alone would -- would -- oh,
20 wait. So you're saying if the -- if the trace had
21 different starting points and end points? I mean, they
22 still could be parallel as laid out on a board, but if
23 the communications are going to different places,
24 then -- then -- then if communications over those traces
25 are going to different places, I don't think that's what

1 is thought of as -- as -- as parallel links or traces,
2 or links.

3 BY ATTORNEY STAMATOPOULOS:

4 Q. And when you say "that is thought of," you
5 mean by a person of ordinary skill in the art?

6 A. Yes.

7 Q. Dr. Houh, you prepared your declaration in
8 connection with the '740 patent. Correct?

9 A. Yes.

10 Q. Dr. Houh, what is your hourly rate in this
11 case?

12 A. I don't remember exactly. I think it might be
13 620.

14 Q. And how much would you say you have billed to
15 date?

16 ATTORNEY CLEMENTS: Objection. Scope.

17 A. I -- I don't have that number in my head.
18 That's --

19 BY ATTORNEY STAMATOPOULOS:

20 Q. Would you say that you've billed more than you
21 would generally bill for a case of this sort, or less?

22 ATTORNEY CLEMENTS: Objection. Relevance.

23 A. I -- I -- I don't think this case was unusual
24 one way or the other.

25 BY ATTORNEY STAMATOPOULOS:

1 Q. And in total, in these types of cases, you
2 billed between 25- and \$30,000?

3 ATTORNEY CLEMENTS: Objection. Relevance.

4 A. I mean -- I mean, it depends over what period
5 of time, but -- but if it were just one patent in one --
6 one case just for submitting a declaration, it wouldn't
7 necessarily be that much, necessarily. But if then it
8 was, you know, preparing for deposition and things like
9 that, cases might get up to that range, but not -- not
10 always.

11 Q. What did you do to prepare your declaration?

12 A. You know, I reviewed a number of documents. I
13 had discussions with attorneys. I -- I mean, that's
14 pretty much the high level of what goes into it.

15 Q. You reviewed documents and you had
16 discussions?

17 A. Yes.

18 Q. That's what you did to prepare your
19 declaration?

20 A. Well, then there would be a draft and then
21 there would be edits. It -- oftentimes, these are
22 collaborative efforts so, you know, attorneys make some
23 edits, I review the edits, I -- you know, things like
24 that.

25 Q. How much time would you say you spent in

1 connection with preparing your declaration in total?

2 A. I mean, it's -- I don't -- I don't know. I
3 don't recall for every different declaration I write,
4 but it could have been on the order of 15, 20 hours,
5 give or take some. I don't -- I don't recall exactly
6 for this case.

7 Q. So to review the patents, to review the prior
8 art, to have discussions with attorneys, and to prepare
9 your declaration, which is roughly 100 pages, you spent
10 about 15 to 20 hours.

11 Is that fair?

12 A. It was probably a little more than that, but
13 I -- I didn't -- again, I don't remember the exact time.

14 Q. Fair to say that you are familiar with all of
15 the materials cited in your declaration?

16 A. I mean, generally.

17 Q. And to the extent that you found something to
18 be relevant in those materials, you identified it in the
19 declaration. Correct?

20 A. I would have tried to, yes. You know, for
21 supporting references and whatnot, I think I -- I did
22 identify some of those.

23 Q. When you say "supporting references," you mean
24 references other than the Bruckman, Basso, and
25 Holdsworth references?

1 A. Yes.

2 Q. For the Bruckman, Basso, and Holdsworth
3 references you were very careful to include all relevant
4 citations. Correct?

5 ATTORNEY CLEMENTS: Objection. Form.

6 A. I mean, I -- I'm -- I'm not sure about that.
7 I mean, sometimes something might be said multiple times
8 and I might cite a few, or even one. But it's what the
9 specification says.

10 BY ATTORNEY STAMATOPOULOS:

11 Q. But if something was relevant, you didn't omit
12 it, right?

13 A. Well, if it said something the same, I
14 wouldn't necessarily include -- I mean, I might --
15 sometimes I do, but I wouldn't necessarily include all
16 of them.

17 Q. Okay.

18 A. I mean, I -- you know, the cites are what they
19 are. And there may be other similar statements within
20 some of these references that weren't cited but are yet
21 still there but are consistent with the ones I did cite.

22 Q. I want to invite your attention to
23 Paragraph 14 of your declaration.

24 A. Okay.

25 Q. You state here: As explained by the prior

1 art, link aggregation is a technique by which a group of
2 parallel physical links between two end points in a data
3 network can be joined into a single logical link.

4 Do you see that?

5 A. Well, if you are reading verbatim, you left
6 out a word. But that's a -- a citation from -- from
7 Bruckman.

8 Q. Do you agree with the statement from
9 Dr. Bruckman?

10 A. I mean, I don't think I have any cause to --
11 to disagree specifically with this statement.

12 Q. Is this had a comprehensive definition of link
13 aggregation?

14 A. I think it's just a statement that it says. I
15 wouldn't necessarily characterize it the way you are.

16 Q. You mean you wouldn't characterize it as a
17 definition?

18 A. Yeah, I wouldn't characterize it the way you
19 characterized it in your question. It's simply a
20 statement. And, as I said, I have no reason to disagree
21 with what it's saying here.

22 Q. To be clear, I'm just asking if you consider
23 this to be a definition of link aggregation.

24 Do you consider this statement from Bruckman
25 to be a definition of link aggregation?

1 A. I think it's just a statement. I'm not saying
2 it's a definition here. It's a description of something
3 that Bruckman is saying that link aggregation can be,
4 and it's simply an example given in Bruckman. And
5 I'm -- I'm not -- I don't have any words around that
6 that says this is what the definition is in my
7 declaration.

8 Q. That statement in Bruckman refers to a
9 physical link.

10 Do you see that?

11 A. I see that in the middle of the statement, the
12 phrase "physical links."

13 Q. What are physical links? Well, let me
14 rephrase that.

15 What would have been a person of ordinary
16 skill in the art's understanding of the term "physical
17 links"?

18 A. I think a person of ordinary skill would have
19 understood that to be something like some of the
20 examples I've given where you have a, like a optical
21 fiber that -- that connects two points. Could have been
22 a cable. And that would be in -- in the protocol used
23 over -- over to -- to -- to get the data from one side
24 to the other is, I think, an example of what a POSITA
25 would think a physical link is.

1 Q. And just to avoid having to repeat "POSITA"
2 and "person of ordinary skill in the art" all the time,
3 if I ask you what the meaning of something in Bruckman,
4 Basso, other prior art references is, would it be fair
5 to just say ahead of time right now that I'm referring
6 to a person of ordinary skill in the art's understanding
7 of that term?

8 A. Sure. I think that'd make things a lot
9 easier.

10 Q. Great. So let's do that.

11 With that clarification, what is a logical
12 link?

13 A. So a logical link is something -- one example
14 might be something like a -- a -- like a virtual circuit
15 in an ATM where -- where it -- it looks to the computer.
16 You know, there's some other end point to the computer C
17 based on the higher layer protocol, whatever it happens
18 to be. And you -- to that level of abstraction, you're
19 not really thinking about whether it's traversing zero,
20 1, 2, or more physical links, that it's just a -- a -- a
21 logical connection between two end points at -- at -- at
22 the particular layer of the protocol stack that -- that
23 you'd consider that for.

24 Q. And the two end points could be two different
25 network devices, like two routers?

1 A. Well, there are things that would end connect
2 routers, like -- like label-switched paths, for example,
3 that -- that terminate at the routers. But there could
4 be other -- other things. Like, in -- in the network
5 that we built, we terminated the virtual circuits at --
6 at the computers themselves. So I guess it depends what
7 protocol you'd be -- you'd be considering.

8 Q. Now, the terminal points of the physical links
9 are not necessarily the same as the end points of the
10 logical links. Correct?

11 A. I think in some cases they could overlap and
12 some cases, they could -- they would be different. That
13 is, multiple physical links could be part of one virtual
14 link. For example, a label-switched path within a
15 network.

16 Q. In the context of link aggregation, what is
17 the meaning of parallel physical links?

18 A. Well, like -- like it says here in this
19 citation from Bruckman, the parallel physical links
20 between two end points in the data network, that --
21 that -- that can be joined together into a single
22 logical link. That is, again, the two end points just
23 get the data that's transmitted. You don't really care
24 whether it's transmitted over the links serially in some
25 fashion or whether at some points in the network the --

1 the data flows in parallel to achieve higher bandwidth
2 but is -- is then, you know, constructed in the right
3 way that it arrives to the other end point in the
4 fashion it was designed to arrive.

5 Q. Can you have parallel physical links outside
6 of the -- outside of the context of link aggregation?

7 A. Sure.

8 Q. Is it possible for links -- let me withdraw
9 that.

10 Is it possible for physical links that are not
11 parallel outside of the context of link aggregation to
12 be part of the same link aggregation group?

13 ATTORNEY CLEMENTS: Objection. Form.

14 A. I -- I -- in a virtual sense, sure, you could
15 have different virtual links between two end points that
16 don't share any of the physical paths other than the end
17 nodes. And one could use those in the same way as long
18 as one did the same things at the end points to -- to
19 figure out how to use those two sets of virtual links.

20 Q. In Paragraph 15 you state that: When using
21 link aggregation, a mechanism is used to determine which
22 of the physical links will transmit a particular frame.

23 Do you see that?

24 A. Yes.

25 Q. What physical links are you referring to here

1 in this statement?

2 A. One example would be if there are multiple
3 physical links connecting two end points and they're
4 going to be used in a way to -- in parallel to achieve
5 higher bandwidth, then it would be the -- the physical
6 links, for example, described in the -- the citation at
7 the top from Bruckman, which is physical parallel links
8 that interconnect to --

9 THE REPORTER: There was an interruption. Let
10 me read back where you were.

11 (The reporter read from the record.)

12 THE WITNESS: Between two end points in a data
13 network, for example.

14 BY ATTORNEY STAMATOPOULOS:

15 Q. And so you need a mechanism to determine which
16 of the physical links will transmit a particular frame
17 when presented with an option between several different
18 physical links that connect between two end points,
19 right?

20 A. I mean, I do talk about such a mechanism in
21 Paragraph 15.

22 Q. What -- do you need a similar mechanism when
23 there is only one physical link available for a
24 connection between two end points?

25 ATTORNEY CLEMENTS: Objection. Form.

1 A. I don't think it would be necessary in such a
2 case, but you could certainly have a distributor
3 function that -- that distributes frames among one link.
4 But it wouldn't be necessary to do so --

5 Q. And why --

6 A. -- if you're --

7 Q. Why would it not be necessary?

8 A. Because there's -- you -- the -- the purpose
9 of -- one of the purposes of doing such aggregation is
10 to achieve higher bandwidth by using two parallel paths.
11 So you'd -- you'd want to leverage the fact that you can
12 use two parallel paths to go faster than one path. But
13 if there's one path, you don't really have a choice if
14 there's one physical link between -- you know, to the
15 other element. You don't really have a choice. Doesn't
16 mean you couldn't distribute among one link, but it's
17 just not -- wouldn't do anything to speed it up or speed
18 up the data transfer.

19 Q. And the reason it wouldn't do anything to
20 speed up the data transfer is because you don't really
21 have a choice in terms of what link to transmit the data
22 frames over. Correct?

23 ATTORNEY PANETTA: Objection. Form.

24 A. Sure. But it doesn't mean you could use --
25 you wouldn't use some sort of selection method to choose

1 that one link, regardless. But -- but it -- it wouldn't
2 achieve the purpose of -- of speeding up the transfer by
3 sending some data along one physical link and other data
4 along a second physical link. It doesn't shorten the
5 time to transfer if there's just one link.

6 BY ATTORNEY STAMATOPOULOS:

7 Q. Can links be determined randomly?

8 A. If you have an appropriate random number, if
9 you use the random number in the appropriate way, you
10 could -- you could use like a random number to determine
11 which link to use.

12 Q. Can you hardwire links such that a selection
13 is just unnecessary?

14 ATTORNEY CLEMENTS: Objection. Form.

15 A. I'm not sure what you mean, to hardwire, but
16 you could certainly build a circuit that -- that just --
17 that you -- you would transmit something to and it would
18 take care of -- it would take care, un -- unknowing to
19 you, how it did it, of -- of selecting the link.

20 I mean, these things are all abstractions at
21 some layer. So you could certainly build something that
22 the sender wouldn't know about that was actually
23 distributing it in a way. But -- but at the lower layer
24 there'd be some decision about which link to use.

25 BY ATTORNEY STAMATOPOULOS:

1 Q. You said these are abstractions where you
2 don't necessarily know in all instances how the
3 selection is performed. Correct?

4 ATTORNEY PANETTA: Objection. Form.

5 A. Yeah. I mean, there are abstractions to
6 the -- some higher layers that, if you're just sending
7 data, you don't necessarily know what packet goes via
8 which link in a network because at -- at that -- at that
9 level, you know, you're just trying to send data to
10 another user and it doesn't really matter how it gets
11 there to -- to -- to that layer, to that, you know, to
12 that layer.

13 And -- and abstraction helps separate
14 functions in a way that thing -- you know, a lot of
15 things are easier to -- to code and things like that.
16 There's a lot of good reasons for that.

17 BY ATTORNEY STAMATOPOULOS:

18 Q. The '740 patent describes a hashing function
19 that shows specifically how a selection is made with
20 respect to the links over which frames are transferred.
21 Correct?

22 A. Yeah, I -- I recall somewhere in the -- in the
23 '740 specifications a particular example of using a
24 hashing function and -- and how to -- how to use it to
25 select one group or another.

1 Q. What is -- you mentioned a distributor
2 earlier. Remember that?

3 A. I did, yeah. I do remember that.

4 Q. Before going into the distributor, I want to
5 go back to your statement that a mechanism is used to
6 determine which of the physical links will transmit a
7 particular frame.

8 You're saying mechanism is used, passive
9 voice. By whom is the mechanism used? That's in
10 Paragraph 15.

11 A. Well, one place that would use it is the --
12 the circuitry or control circuitry at -- at where the --
13 where there are multiple physical parallel links.

14 Q. And would that be a single circuit performing
15 the selection, or multiple circuits performing the
16 selection?

17 A. I mean, I suppose it depends how it's
18 architected, but it -- there's -- I'm not saying
19 explicitly that it has to be done one way or -- or the
20 other of that.

21 Q. But it could -- it could be done one way or
22 the other. Correct?

23 A. I mean, there's lots of ways to design digital
24 circuitry or control circuitry or software that -- you
25 know, associated with such circuitry.

1 Q. The '740 patent refers to a specific control
2 module that performs this selection. Correct? Let me
3 withdraw that question.

4 Let me invite your attention to the '740
5 patent, which is Exhibit 1001 to your declaration, and
6 specifically, column 7, line 50.

7 A. Okay, I'm there.

8 Q. So I don't want to read the entire passage,
9 but it refers -- it refers to module 60.

10 Do you see that?

11 A. Yes.

12 Q. Module 60, if you go back to Figure 1 of the
13 patent, is labeled Control.

14 Do you see that?

15 A. Sorry, where?

16 Where are you referring me back to?

17 Q. Figure 1.

18 A. Oh.

19 Q. In the patent.

20 A. Yes, I see that.

21 Q. So module 60 is actually the control module in
22 the '740 patent.

23 Do you agree with that?

24 A. Yeah, I generally agree. And there's various
25 other descriptions of control module 60, like in the top

1 of column 6 where it says that it may be implemented in
2 hardware as software code running on a suitable
3 processor, or as a combination of hardware and software
4 elements.

5 And it goes on, but it gives -- you know, like
6 most patents, there's all sorts of flexibility as to how
7 the control module could be implemented.

8 Q. But the '740 patent nevertheless refers to a
9 specific control module 60, right?

10 A. Well, it uses the specific label, and it
11 refer -- and it uses the label and figures, but there's
12 all sorts of flexibility as to how exactly that control
13 module is -- is implemented.

14 Q. The control module, for example, is discrete
15 from the multiplexer. Correct?

16 A. Well, in -- I mean, Figure 1 is described
17 as -- as a block diagram that schematically
18 illustrates -- illustrate communication systems, and
19 it's an example of an embodiment. But in that figure,
20 the -- the -- in the schematic, they -- they are
21 separate boxes in the schematic.

22 Q. And there's no reference in the '740 patent of
23 the control module, for example, performing
24 multiplexing. Correct?

25 A. Well. It does specifically say -- column 6,

1 line 3 -- that module 60 may comprise an independent
2 module or be integrated with other components of network
3 element 32.

4 So again, there's all sorts of flexibility
5 that whatever -- the module is schematically illustrated
6 separately, but it certainly talks about how that module
7 can be integrated with other components of 32, which
8 includes the multiplexer.

9 Q. Okay. Let's go to Claim 17 of the '740
10 patent.

11 A. Okay.

12 Q. This is an apparatus claim, right?

13 A. Yes.

14 Q. And this apparatus claim recites: A control
15 module which is arranged to select for each data frame
16 sent between the communication network and the network
17 node in a single computation based on at least one of
18 the frame attributes a first physical link out of the
19 first group and a second physical link out of the second
20 group over which to send the data frame.

21 Do you see that?

22 A. Yes.

23 Q. Fair to say for -- at least for Claim 17 that
24 the control module is the device within the claimed
25 apparatus that is tasked with selecting physical links

1 out of a first group and physical links out of a second
2 group?

3 A. I mean, Figure 17 is describing what the
4 apparatus comprises, and it does call out separately the
5 control -- a control module and specifically says
6 it's -- it's -- the control module is arranged to select
7 and -- and use -- it uses that word in -- in -- in that
8 element that -- that you -- you asked in your question.

9 Q. And then Claim 21 depends from Claim 17,
10 right?

11 A. Yes.

12 Q. Claim 21 recites an apparatus that comprises a
13 multiplexer. Correct?

14 A. Yes.

15 Q. So Claim 17 doesn't require a multiplexer.
16 Fair?

17 ATTORNEY CLEMENTS: Objection. Form.

18 A. I mean, just looking at Claim 17, I don't see
19 the word "multiplexer" in Claim 7 -- as -- as part of
20 anything in Claim 17.

21 BY ATTORNEY STAMATOPOULOS:

22 Q. A multiplexer is added in the dependent
23 Claim 21. Correct?

24 A. I think that's fair.

25 Q. In analyzing the Claims of the '740 patent did

1 you take into account in your analysis that the
2 multiplexer appears in a dependent claim and not in an
3 independent claim?

4 A. I mean, I do review the -- the claims in --
5 you know, when I review the patent in preparation of my
6 declaration, so I considered the teachings of -- I did
7 consider generally what the '740 says.

8 Q. How, if at all, did this distinction between
9 Claim 17 and Claim 1 factor into your opinions?

10 A. Well, I mean, certainly it's something if --
11 if in -- in the prior art something discloses a -- a
12 multiplexer as part of an apparatus, it both shows how
13 it meets Claim 21, that element, and it -- so, I mean,
14 I -- that -- that's the kind of -- and -- and -- and it
15 wouldn't necessarily be required by Claim 17 itself, but
16 it could still have it. And the apparatus clearly could
17 still have it, it's just no requirements are imposed by
18 Claim 17. I mean, claims are, what I understand, are --
19 are -- I'm not sure if I'm using the right legal term,
20 but open-ended.

21 The apparatus must comprise what it says it
22 comprises, but nothing prohibits the apparatus from
23 having more components than what's -- what's claimed.

24 Q. What is a distributor function?

25 A. That phrase is used in the citation I have in

1 Paragraph 15. And if you look at the Bruckman reference
2 for the context of 15, it -- it -- it talks about the
3 link aggregation is in the background. It's talking
4 about link aggregation being described by an IEEE
5 standard and the -- how the link aggregation sublayer
6 comprises a distributor function and describes the
7 function there as something which distributes data frame
8 submitted by Mac clients among the physical links in the
9 group, referring to an -- a link aggregation group, I
10 think. So that -- that's what's being described in --
11 in Bruckman in -- in the background.

12 Q. In Paragraphs 17 through 21 you have various
13 opinions concerning multiplexing and demultiplexing.

14 Do you see that?

15 A. Yes.

16 Q. Why did you consider it relevant to describe
17 multiplexing and demultiplexing in your declaration?

18 A. Well, I'm giving a background of the
19 technology and some of the -- what's described in -- in
20 various references. And so it just helps frame the
21 context for when I use these terms and -- and how
22 they're used in the various references.

23 Q. You said "background of the technology."

24 What technology is that?

25 A. I mean, these are the type of things as --

1 that a POSITA, as I've laid out, would -- would
2 understand based on their level of education and
3 experience, and these are example of -- of -- of some of
4 those things.

5 Q. You testified when I asked you my previous
6 question that you're giving a background of the
7 technology in this section that refers to multiplexing
8 and demultiplexing.

9 What technology were you referring to in your
10 previous answer?

11 A. I mean, generally at a high level it would be
12 the technology areas that the person of ordinary skill
13 has experience in that -- that -- that I've -- as I've
14 defined in, you know, in my declaration.

15 Q. And you're talking about technologies that are
16 relevant to the '740 patent?

17 A. Well, under the definition as I've laid out
18 that -- that is with respect to the '740 patent in terms
19 of what the POSITA is.

20 Q. So it's your view as you sit here today that
21 multiplexing and demultiplexing are a focal point of the
22 '740 patent, right?

23 ATTORNEY CLEMENTS: Objection. Form.

24 A. I don't think I said "focal point," I just
25 think I -- it's -- it's relevant. And -- and to the

1 extent the reader or the -- the -- the -- the PTAB panel
2 may not necessarily have in mind some -- what some of
3 these terms are -- are -- how they relate to this
4 technology as I'm -- I'm laying it out.

5 BY ATTORNEY STAMATOPOULOS:

6 Q. So you consider multiplexing and
7 demultiplexing relevant to your analysis of the '740
8 patent claims. Correct?

9 A. Sure. I think -- I think they have some
10 relevance. I don't -- that's why I included some of
11 this here.

12 Q. And you're aware that multiplexing is only
13 required by certain dependent claims in the '740 patent,
14 right?

15 A. Yeah, I mean, I think there are a few
16 dependent claims that do use the word "multiplexing."

17 Q. And no independent claims. Correct?

18 A. I don't believe I saw that particular word
19 in -- in any of the independent claims.

20 Q. I want to invite your attention again to
21 Figure 1 of the '740 patent.

22 Are you there?

23 A. Yes.

24 Q. In Figure 1 of the '740 patent, the
25 multiplexer is a discrete component from each of the

1 line cards. Correct?

2 A. Well, Figure 1 is a schematic illustration or
3 a schematic diagram, and it has different boxes. But as
4 we saw in the top of column 6, the actual implementation
5 could be there -- there's a lot of flexibility where the
6 control -- the unit could be integrated with, you know,
7 whatever it said. It said other components of the -- of
8 32, which includes multiplexer.

9 So I think there's flexibility in how things
10 are -- are implemented. And most patents talk about
11 that kind of flexibility.

12 But with respect to Figure 1, as a schematic
13 illustration, it's illustrating them with separate boxes
14 or parts of the figure.

15 Q. Figure 1 shows that the line -- each of the
16 line cards is connected to the multiplexer through
17 backplane traces. Correct?

18 A. I think the example of -- in Figure 1 does
19 show line cards connected with the backplane traces 56
20 to multiplexer.

21 Q. And the same holds true for Figure 2?

22 A. Yeah. The Figure 2 example figure also shows
23 that.

24 Q. The same holds true for Figure 3?

25 A. Yes, I would agree.

1 Q. Figure 4 shows something different from an
2 apparatus. It just shows a flow chart for a process.
3 And I'm not going to ask you questions about that, just
4 confirming that Figure 4 doesn't show an apparatus.
5 Correct?

6 A. Yeah, I generally agree.

7 Q. And Figure 5, which does show an apparatus,
8 also shows that the multiplexer is connected to
9 different modules labeled 100 through backplane traces.
10 Correct?

11 A. I think the different modules are labeled 100
12 and 101 in this example of Figure 5.

13 Q. And these two modules are also line cards.
14 Correct?

15 A. I think if you look at the description of this
16 exemplary -- with -- with an embodiment, an example
17 embodiment of the invention at column 8, line 27, it
18 does say that. It does use line card in conjunction
19 with the labels 100 and 101.

20 Q. So in every single figure of the '740 patent,
21 the multiplexer is shown as connected to line cards
22 through backplane traces. Correct?

23 A. I think in the four example embodiments in
24 Figures 1, 2 -- 1, 3, 4 -- 1, 2, 3, and 5, that -- that
25 does -- the -- all the -- all the traces are -- are

1 connected to things described as line cards.

2 Q. And the traces connect the line cards to the
3 multiplexer. Correct?

4 A. In those figures for the four example
5 embodiments, that would be the case for those figures.

6 Q. And those are the only figures that show
7 example embodiments in the '740 patents, to be clear.
8 Correct?

9 A. Well, there -- there's just those five figures
10 that we discussed. There are no other figures in it.

11 But as you know, patents give a lot of
12 flexibility. And I'm not sure that -- that -- that I
13 see the word "line card" in at least Claim 1, although
14 I -- I'm just trying to take a look.

15 But I don't know that that phrase is -- is
16 necessarily used in all or any of the claims or -- and
17 it could be used in some of them. I could -- I don't
18 recall.

19 Q. You've offered -- you've offered some opinions
20 in your declaration about the construction of certain
21 terms. Correct?

22 A. I have a section on claim construction which
23 does discuss a few issues relating to a few phrases used
24 in the claims.

25 Q. You said earlier that you did not see the word

1 "line card" included in Claim 1.

2 Do you remember that?

3 A. I -- I -- I do remember that --

4 Q. How is that --

5 A. -- because I was looking at it just now.

6 Q. How is that relevant to what is shown in
7 Figures 1 through 5 where there is no description of the
8 line card that includes a multiplexer?

9 A. Could you repeat that question?

10 Q. I'll try to ask a better question.

11 So we were discussing the Figures 1 through 5,
12 which all show that line cards are connected to
13 multiplexers through backplane traces.

14 Do you recall that?

15 A. Figure 4 didn't show that, but sure.

16 Q. Right. Figure 4 did not. Figures 1, 2, 3,
17 and 5 did. Correct?

18 A. In those example embodiments, that -- that
19 was -- in those figures, that's how those particular
20 example embodiment figures are laid out.

21 Q. And you said, following that -- that colloquy,
22 that independent Claim 1 does not recite a line card.

23 Do you remember that?

24 A. Yes.

25 Q. Can you explain to me why you said that?

1 A. Well, you were saying that every figure shows
2 this, every figure shows that. But I'm pointing out
3 that the -- the claims are what -- what -- what I
4 analyzed. And the claims don't have, I -- I believe --
5 I don't believe any of the claims actually use the
6 phrase "line card."

7 And so what's required by the claims is
8 required by the claims. If -- if the patent owner has a
9 position that -- that somehow, a line card is required
10 by the claims, I -- I understand that would be a claim
11 construction issue that -- that could have set forth in
12 the preliminary response. I don't recall that. Or --
13 or could lay out further in a response after -- after --
14 later. But I'm merely pointing out that the claims
15 themselves I didn't see required or used the phrase
16 "line card."

17 Q. Would it be reasonable for a person of
18 ordinary skill in the art to look at the claims and
19 interpret them as reciting, among other things, a line
20 card?

21 A. I usually spend a lot of time looking at claim
22 construction arguments. I wouldn't venture a -- I'm
23 not -- you know, I haven't given that opinion in my
24 declaration.

25 Q. Now, you wrote your declaration, right?

1 A. Again, it was a collaborative effort. There
2 were portions that I wrote, but it -- but in the end,
3 they are my opinions and I signed it and I stand by
4 them.

5 Q. And you reviewed your declaration in preparing
6 for your deposition today?

7 A. Yes.

8 Q. And you have a section in your declaration
9 that relates that claim construction. Correct?

10 A. Yes.

11 Q. You wrote that section.

12 A. I certainly had discussions about it, but
13 whether or not I wrote all the words, I mean, I may
14 have. Again, there's some edits that go back and forth,
15 but they -- if -- they were based on -- the declaration
16 is based on discussions that I -- I had initially with
17 the attorneys.

18 Q. In Paragraph 33 of your declaration you
19 discuss the term "interface module," right?

20 A. Yes. It's under the subsection labeled
21 Interface Module.

22 Q. And at the end of that, you state your opinion
23 that a line card is thus an interface module as claimed,
24 right?

25 ATTORNEY CLEMENTS: Objection. Form.

1 A. I mean, I do say that at the end of that
2 paragraph, and that's an example of what a person of
3 ordinary skill would have understood an interface module
4 to include.

5 BY ATTORNEY STAMATOPOULOS:

6 Q. And an interface module is recited in the
7 claims, right?

8 A. You know, various forms of like, plural,
9 interface modules is -- is cited in at least some of the
10 claims.

11 Q. Okay. The only example of an interface module
12 you've given in your declaration is that of a line card,
13 right? I'm talking about Paragraph 33, by the way.

14 A. Just Paragraph 33.

15 Q. Where you state your opinion as to the proper
16 construction of an interface module.

17 A. I -- I -- I'm not -- just to be clear, I'm --
18 I'm not -- I'm discussing inter -- interface module as
19 it relates to claim construction.

20 I wouldn't characterize it the way you asked
21 me the question, but certainly at the end I do say that
22 a line card is an interface module as claimed. And --
23 and that -- that means really that a line card is an
24 example of what a person of ordinary skill would --
25 would -- would -- would understand is included in

1 interface modules. And so that's an example the person
2 of ordinary skill would understand.

3 ATTORNEY STAMATOPOULOS: Is this a good time
4 to take a break for lunch, or what do we want to do?

5 (A recess was taken for lunch.)

6 BY ATTORNEY STAMATOPOULOS:

7 Q. Welcome back, Dr. Houh.

8 A. Yes.

9 Q. I'd like to ask you to turn to your
10 declaration and Paragraph 17 in the declaration.

11 You state in Paragraph 17 that link
12 aggregation uses a concept referred to as multiplexing.

13 Do you see that?

14 A. Yes.

15 Q. Is multiplexing always performed in the
16 context of link aggregation?

17 A. I mean, in the situations that I can think
18 of -- think of here that the -- the function of
19 multiplexing is part of the point, which is to take
20 items from different links and put them all on the same
21 outbound link. So I think that that is a description
22 of -- of what multiplexing is.

23 Q. The independent claims of the '740 patent do
24 not require multiplexing. Correct?

25 A. I think they use the word "multiplexing" I saw

1 used in dependent claims, but I don't believe is -- I
2 saw used in independent claims.

3 Q. You state that a multiplexer selects from a
4 plurality of input lines for transmission over a single
5 output line.

6 Do you see that?

7 A. I -- yes.

8 Q. What is an input line?

9 A. Well, referring to the multiplexer, there are
10 inputs in the multiplexer, a plurality of them, and
11 that's the data that's coming into the multiplexer.

12 Q. And the input line is the physical link that
13 allows the data to come into the multiplexer. Correct?

14 A. In -- in -- in some of these examples there
15 are physical links that -- that -- that provide the
16 inputs.

17 Q. And there are physical links that provide the
18 outputs. Correct?

19 A. Yeah, I think some of the examples show that.

20 Q. And the term "output line" refers to those
21 physical links. Correct?

22 A. Yes. But just to be clear, in -- in the
23 examples I -- I cite, there's just one output, so -- so
24 it's not a plurality necessarily. It -- it could be, as
25 we discussed earlier, but -- but the examples I don't

1 think show a plurality of outputs.

2 Q. And a multiplexer combined signals from
3 multiple input lines into a single output line.
4 Correct?

5 A. I mean, I think that's an example of what some
6 multiplexers do.

7 Q. And what's the basis for your opinion in
8 Paragraph 17 that a multiplexer selects from a plurality
9 of input lines?

10 A. I mean, part of it is just my -- the -- the
11 general level of skill of a POSITA. They'd understand
12 that.

13 And typically, multiplexers have an input
14 which is literally called Select, which -- which are --
15 gets the -- tell the multiplexer which input to select
16 for the -- for passing to the output at that particular
17 time.

18 Q. And does the multiplexer select the single
19 output lines into which the input data is combined?

20 A. Well, oftentimes, if -- if there's just one
21 output, I wouldn't say that's the case. If they're like
22 an 8-bit input and output, I also wouldn't say that's
23 the case because that -- the -- the 8 parallel -- 8 bits
24 are passed as -- as the same 8 bits to the output if
25 there are more. But typically, in the example of one

1 output, there would be no selection of which output to
2 use. It's just --

3 Q. Why not?

4 A. -- a selection of which input to -- to pass to
5 the output at that time.

6 Q. Sorry, I didn't mean to speak over you.

7 Why not?

8 Why is there no selection of an output when
9 there is only a single output?

10 A. Well, I mean, where there's a single output,
11 it's designed -- the design or the -- of most
12 multiplexers with a single output is to take and select
13 which output to present -- sorry, which input at that
14 time to present to -- to the output. So that's just
15 design. I mean, it's -- it's a multiplexer, not --
16 there are demultiplexers, which go in reverse, but a
17 multiplexer is one that takes multiple inputs and
18 selects which inputs to pass at that particular time to
19 the -- to the output.

20 Q. And the reason there's no output selection is
21 because there's only a single output, right?

22 A. That's one reason, sure.

23 Q. Now, in Paragraph 18 of your declaration you
24 state -- you state that the demultiplexer selects one of
25 several output lines. Correct?

1 A. Yeah. I mean, it doesn't say that exactly,
2 but that's the gist of the first sentence of 18.

3 Q. And a demultiplexer in the example of
4 Paragraph 18 does not select an input line. Correct?

5 A. That -- that's not what a -- a deplexer
6 (phonetic) is the -- the reverse or opposite of a
7 multiplexer, as I say in -- in 18.

8 Q. Right. And this demultiplexer in Paragraph 18
9 does not select an input line, right?

10 A. Well, I mean, typically in a demultiplexer, at
11 least in this example, there's just one input signal
12 line. There -- there's other inputs as well that's like
13 the select inputs, but the -- the signal input that's to
14 be demultiplexed, there's typical -- in this -- these
15 examples, there's one.

16 Q. And so for that reason there is no selection
17 of that one input. Correct?

18 A. That -- that's among the reasons, sure.

19 Q. What are some of the other reasons?

20 A. I mean, there could be others. That's just
21 the way it's designed to operate for -- for -- for a
22 one-input, you know, multiple output demultiplexer, for
23 example.

24 Q. Right. You state -- you said that there are
25 multiple potential reasons, one of which is that there's

1 only one input to select from.

2 What are some of the other reasons for which
3 there is no selection? Can you think of any as you sit
4 here today?

5 A. Well, I --

6 ATTORNEY CLEMENTS: Objection. Form.

7 A. That slightly didn't capture exactly what I
8 said. There's only one signal input for demultiplexing.
9 There's other multiple inputs. There's the select
10 inputs typically, which select which output line. And
11 those are inputs to the demultiplexer as well, it's just
12 not the signal input.

13 But -- but -- but, you know, it's -- the
14 logical function that's performed by a demultiplexer as
15 specified by the input/output mapping, so it's just the
16 function that's specified for that particular logic
17 device. There are multiple inputs. One of them is
18 typically considered the signal input. But to the logic
19 device itself, I mean, it -- the internal logic is just
20 doing what the logic is programmed to do.

21 And so if you set up the right input/output
22 table for, say, you know, 16 outputs, four select
23 inputs, and one signal input, it's just what -- how that
24 logic of mapping of -- of 5 inputs to 16 outputs would
25 be. That's just the logic design.

1 And it happens to perform the function of
2 taking one input considered the signal and -- and
3 outputting the signal to one of, in the -- in this
4 example, 16 outputs based on the four input select bits.
5 But again, it's just the way the logic is assigned.

6 Q. In Paragraph 19 you show a multilevel
7 demultiplexer. Correct?

8 A. Yes.

9 Q. And there is only a single input line to that
10 multilevel demultiplexer. Correct?

11 A. Well, there's a single signal input, but there
12 are other select inputs. But -- but there's a signal,
13 like, input bit which maps to the bit that you want
14 to -- or the input that you want to transfer to the
15 selected output at that particular time.

16 Q. And that single input could be a frame.
17 Correct?

18 A. Well, it depends on -- whatever bits are
19 presented in serial fashion at that input, so long as
20 the select bits stay the same, would be passed through
21 the logic with appropriate hardware delays to the -- to
22 the selected output line. And that's -- that's the way
23 a demultiplexer in this particular type of digital
24 circuit would be designed.

25 Q. And this --

1 A. So the serial input represents a frame over
2 time, and the output would similarly, under the same
3 protocol, represent the same frame.

4 Q. Now, in this multilevel demultiplexer there
5 are 16 output lines, or 16 signal output lines.
6 Correct?

7 A. I mean, those are the only outputs in the
8 demultiplexer. They're all possible lines for the
9 signal to be demultiplexed onto.

10 Q. And if one were to select a particular output
11 line from these 16 output lines, how many possible paths
12 are there for a data frame to travel through starting
13 from the input to that predetermined output line?

14 A. I mean, in -- in this particular example,
15 which is also very similar to one of the examples laid
16 out in the '740 patent, in terms of the way things are
17 laid out, are part of a figure.

18 In this particular example, when there's --
19 one of the outputs is selected, there's -- at -- at
20 the -- well, I'm calling it here the first level.
21 There's -- there's one -- one line interconnecting the
22 second level to the first level, which would be
23 appropriately selected for the output at the second
24 level depending on, you know, the -- the select bits
25 which -- which I've labeled as the first 2-bit command

1 signal that -- that are going into the one demultiplexer
2 at that -- at the second level.

3 Q. So in this -- in this example, there's only
4 one potential path for data to travel from the single
5 input line to one of the 16 output lines. Correct?

6 A. At this logical level, I wouldn't really
7 disagree with that.

8 Q. Are the lines that connect the first level to
9 the second level physical links?

10 A. Sure. I mean, that's an example of how one
11 could pass data from the output of, let's say, the
12 second level to the -- one of the inputs of the first
13 level.

14 Q. Are those lines that connect the second level
15 to the first level arranged in parallel?

16 A. In this particular example, they don't share
17 the same end points, if that's what you're asking about.
18 That is, there's not a number of lines going from the
19 second level to -- to a -- one particular component in
20 the first level. There are -- are different lines
21 going. But again, that kind of matches up with one of
22 the examples laid out in -- in part of one of the
23 figures of the '740 patent.

24 Q. Is that the same example that you referred to
25 earlier in response to my previous question?

1 A. Well, I -- I -- I mean, now, with respect to
2 when I'm referring back to them, I am thinking of -- of
3 one of -- one of the figures, which would be -- for
4 example, Figure 3 has a very similar layout in part of
5 that diagram.

6 Q. Okay, let me -- let me ask you this question.

7 Are any of the backplane traces that connect
8 the line cards in Figure 3 to the multiplexer in
9 Figure 3 arranged in a similar fashion as that shown
10 in --

11 ATTORNEY CLEMENTS: Objection to form.

12 Q. -- in Paragraph 19 of your declaration?

13 And in particular, the lines that connect the
14 first level to the second level of the multilevel
15 demultiplexer shown in that paragraph.

16 ATTORNEY CLEMENTS: Objection. Form.

17 A. I describe the --

18 (Reporter clarification)

19 A. I think you're referring to the multiplexer 44
20 labeled as MUX, but -- but this particular diagram
21 and -- and the description talks about traffic going in
22 both directions.

23 And with respect to number -- the box 72, it
24 describes that as performing multiplexing and
25 demultiplexing functions. And I think it would be

1 understood that -- that 44 does as well.

2 But like, for example, going from 72, traffic
3 going towards the right coming in from the left, that
4 would be demultiplexing at that level. And then -- and
5 then the line card would appropriately select one of
6 the -- the input to go to one of the four traces labeled
7 56.

8 And -- and my point there is that that's --
9 that's pretty much basically the same as -- as the
10 figure that I've shown here in -- in other figures from
11 the prior art.

12 Q. And just to be clear, that's the -- the packet
13 walk or the packet -- let me withdraw that.

14 Just to be clear, just now you were referring
15 to the transmission of frames in the upstream direction.
16 Correct?

17 A. Yeah, in that -- in that diagram it's labeled
18 upstream from the left to the right in -- in Figure 3.

19 Q. And the lines that you identified between
20 what's labeled 72 and what's labeled 32 connect a device
21 that is external to the network element to the network
22 element. Correct?

23 A. So the -- the item in the dotted box is -- is
24 labeled 32, that -- that whole dotted box, and that is
25 in places in the spec described as network element.

1 And 72 is described, I think, as an -- in the
2 particular part of the spec I was looking at, that one
3 example, that was described as external multiplexer, but
4 in column 6, line 27.

5 So, I mean, that's just one example of -- of
6 how -- what's being described and -- and shown in
7 Figure 3.

8 Q. In Paragraph 22 of your declaration you begin
9 your discussion of the '740 patent, right?

10 A. Sure. I wouldn't -- I guess I wouldn't
11 disagree with that.

12 Q. And in Paragraph 23, you -- you provide a
13 description of the network element found in the patent,
14 which states that the network element includes one or
15 more user interface modules, such as line cards.
16 Correct?

17 A. Yeah, I -- I cite that, a passage from the
18 '740 patent specification for that.

19 Q. And each line card is assigned to process data
20 frames from one or more user ports. Correct?

21 A. That's not exactly the way -- the word that
22 this spec -- the spec uses, but I think that's fair.

23 Q. And there are several line cards in the figure
24 shown right -- right beneath Paragraph 23, right?

25 A. Yes. There are N line cards shown in that

1 figure, in Figure 2.

2 Q. And each line card has different groups of
3 ports assigned to it, right?

4 A. In -- in this example of Figure 2 I do say how
5 the line cards 40 are connected to the user node through
6 a set of ports 24.

7 Q. And the ports shown here can be configured as
8 part of a link aggregation group. Correct?

9 A. That's what the citation is saying.

10 Q. And in particular, they can be configured as
11 an ethernet linked aggregation group, referred to as an
12 external LAG group. Correct?

13 A. Yeah, that's -- that's -- that's what the
14 citation says --

15 Q. And the --

16 A. -- in the --

17 Q. Oh, sorry.

18 A. I'm sorry, I didn't -- I -- that's what the
19 cited portion of the spec says.

20 Q. Is it -- is it true that the ports shown here
21 are arranged in parallel that are part of the link
22 aggregation group?

23 A. Well, come of them in the link aggregation
24 group 68 are going to different line cards and it's
25 being -- that's describing that as -- as -- it's -- it's

1 still being described as a link aggregation group, but
2 there are -- are some parallel connections to line card
3 1 and there are additional parallel connections to line
4 card 2 in Figure -- in this example for Figure 2.

5 Q. To the extent that ports that are assigned to
6 different LAG groups -- let me withdraw that.

7 To the extent that ports that correspond to
8 different line cards are assigned to the same LAG group,
9 would those ports be ports of parallel links?

10 A. Well, I mean, I think some of them may be.
11 Like, a -- like the four that go to -- to line card 1
12 might be considered parallel links to line card 1.

13 But there's -- there's additional links to
14 line card 2. There's -- it -- it just shows two. I
15 don't know if it -- so in that example, the two
16 explicitly drawn lines going to line card 2 are --
17 are -- are parallel from, you know, 72 to 24 -- to the
18 line card 240.

19 But I don't think it -- so it's showing that
20 in these LAG groups, they can comprise links that are --
21 are going to different line cards, and that's what is
22 illustrated in this example for Figure 2.

23 Q. So just to be clear, is it your opinion that
24 ports shown in Figure 2 are arranged in parallel insofar
25 as they are connected to the same line card and the same

1 external device?

2 A. Well, I think it could be looked at in --
3 in -- in different ways. So, for example, the overall
4 box 32 is the destination of all those links in that --
5 that particular link aggregation group as similarly
6 illustrated in Figure 3.

7 So in -- in that sense, if -- if you're
8 talking about the connections between 72 or -- in both
9 Figure 2 and 3 and 32, there are -- there -- there are
10 parallel connections between those, you know, devices,
11 for example.

12 Q. And that's because the links 24 in Figure 2
13 have the same end points, correct, if you are referring
14 to 32 and 76?

15 A. That'd be an example --

16 ATTORNEY CLEMENTS: Objection. Form.

17 A. -- if you -- you -- if you weren't -- if you
18 were looking at those boxes at -- at that level.

19 BY ATTORNEY STAMATOPOULOS:

20 Q. If you are looking at Figure 2, that last port
21 24 on line card N, that's not necessarily arranged in
22 parallel to the other ports because it doesn't have the
23 same end point. Correct?

24 ATTORNEY PANETTA: Objection. Form.

25 A. Yeah, I -- I think in the specifications

1 that's not described as -- as the input or coming
2 from -- from 72 or 76. I -- that's what I recall. I --
3 I think I -- if we can go look at that in the spec,
4 that's --

5 BY ATTORNEY STAMATOPOULOS:

6 Q. I'm just asking about the figure, you know,
7 I'm not asking about an interpretation of a
8 specification, just related to this figure.

9 A. Well, I mean, the -- the -- the figure is
10 described in the spec. But the -- but that particular
11 line 24 isn't -- isn't shown to be connected to line
12 by -- anywhere, right? So it's not connected to the box
13 72 or 76, unlike lines that do come out from 72 -- 72 or
14 76 and go into 32, and -- and then in some parts into
15 internal components such as the line cards.

16 Q. And so that last line, 24, coming out of line
17 card N is not parallel to the other lines 24 coming out
18 of line cards 1 and 2. Correct?

19 A. Well, I think because in the -- in the spec
20 and in the -- in the figure it's -- it's not coming from
21 the same place as -- as -- I wouldn't include -- include
22 that in -- in the lines that are parallel between 72 or
23 76 and 32, for example. And -- and that's -- that's not
24 indicated as part of the link aggregation group 68
25 anyway.

1 Q. Right.

2 A. By the way, there's multiple labels 24.

3 But -- but what I'm referring to is the -- is the one in
4 the very bottom left of Figure 2 that's not connected
5 anywhere. There are other lines 24 that are
6 interconnected between, you know, 72 and 32, for
7 example.

8 Q. Now, the backplane trace -- so in the -- in
9 Figure -- let me withdraw that.

10 In Paragraph 25 of your declaration you
11 excerpt another figure, again Figure 2 from the patent.
12 Correct?

13 A. Yes.

14 Q. And here, you discuss in Paragraph 25 the
15 backplane traces that attach to the line cards 1 through
16 N shown in Figure 2. Correct?

17 A. Well, I mean, the backplane traces labeled 56
18 in Figure 2 are connected to, and some are connected to
19 line card 2 and some are connected to line card N. But
20 I think it would be understood that even though ones
21 connected to line card 1 are also 56 traces or traces
22 that are labeled 56 in other line cards.

23 Q. Right. Now I want to draw your attention just
24 to the backplane traces 56 that are connected to line
25 card 2. I want to take line card 2 as an example.

1 Do you follow me?

2 A. Okay.

3 Q. Those traces that connect to line card 2 are
4 all parallel traces because they connect the same line
5 card to the same multiplexer. Correct?

6 ATTORNEY PANETTA: Objection. Form.

7 A. Looking at it at that level, if you are
8 looking at the line card as an individual, then yeah. I
9 mean, those four traces are -- are certainly parallel
10 traces.

11 BY ATTORNEY STAMATOPOULOS:

12 Q. The traces that connect line card 1 to the
13 multiplexer are not parallel to the backplane traces
14 that connect line card 2 to the multi -- to the
15 multiplexer. Correct?

16 ATTORNEY CLEMENTS: Objection. Form.

17 A. Well, again, I think it depends what level
18 you're looking at. You know, there is a big box around
19 line cards 1 through N and so, you know, if you're
20 looking at -- at that big box, I -- you know, the lines
21 coming out of it are parallel to 44. But if you --
22 inside the box, they are going to a different line card.
23 It's just what level you're looking at -- at these
24 things.

25 BY ATTORNEY STAMATOPOULOS:

1 Q. So if I'm looking at it from the level of
2 inside the box, they're not parallel. Correct?

3 A. If you want to describe it as the separate
4 line cards individually, then -- then -- then -- then I
5 think there -- there's another way to look at it where
6 they are parallel, where the -- all the line cards are
7 grouped together, as -- as -- as Figure 2 suggests, by
8 having a box around all the line cards.

9 And at that -- at that level, then that big
10 group, there are parallel lines going from that -- that
11 big outer box to the multiplexer 44.

12 Q. Right. But at the level of just looking at
13 the line cards, they are not parallel. Correct?

14 A. I -- I -- I think that's an example where --
15 where the end points are -- are -- are different. But
16 there are many levels where you can look at it and you
17 realize there are different end points.

18 I mean, if you look inside line card 1 there's
19 a different physical termination that you -- you might
20 say, well, are they parallel or not?

21 Well, at that level, it's a different
22 termination. But at the level of the line card, you
23 have parallel links. And at the level of the cluster of
24 line cards, where -- which is suggested by -- by the box
25 around the line cards, there -- there -- there's

1 parallelism between that, that level of looking at it,
2 and -- and the multiplexer.

3 And if you look within the multiplexer, I
4 mean, it's showing a -- a multiplexer that's one big
5 multiplexer. But inside, it could have been implemented
6 as -- as a staged multiplexer like we -- we've seen, you
7 know.

8 So, you know, it's -- you're looking at it.
9 Are there parallel lines? Yeah, at -- at certain levels
10 of looking at it. But at certain levels, you drill down
11 far enough, you may -- you may say they're -- at -- at
12 that particular level it might not be because they don't
13 show the -- the end points are different. And
14 certainly, you drill down far enough, you might say
15 nothing's parallel.

16 But -- but you know, we were looking at a
17 POSITA can look at all these different layers.

18 Q. And just to be clear -- and just to be clear,
19 you haven't offered any opinions in your declaration as
20 to what level a POSITA would look at this structure from
21 to determine whether different backplane traces are
22 parallel or not. Correct?

23 ATTORNEY PANETTA: Objection. Form.

24 A. I mean, if you want to point me to something,
25 you can ask me about it, but I don't remember if I

1 discussed that.

2 But what I did show was some of the -- the
3 layouts are basically the same layouts, even with the
4 same number of lines and the same number of cards as
5 shown in -- in -- in particularly, for example,
6 Figure 3.

7 And we -- we discussed how that diagram we
8 were talking about earlier from the -- the background
9 section is very similar in layout, exactly the same
10 number of lines as -- as part of Figure 3. And there's
11 a figure from the prior art that -- that -- that fits
12 that as well with exactly the same number of lines and
13 at the -- at the different stages.

14 Q. In Paragraph 26 of your declaration you
15 discuss a hashing operation that is disclosed in the
16 '740 patent. Correct?

17 A. Yeah, I mean, I do cite from a portion of the
18 '740 specification that talks about a hashing operation.

19 Q. And the hashing operation determines for each
20 downstream frame the backplane trace and the port that
21 will transmit a packet. Correct?

22 A. What were the two things you asked about?

23 Q. The hashing operation determines for each
24 downstream frame the backplane trace and the port
25 through which a packet will be transmitted. Correct?

1 A. It -- it -- it -- the portion of the spec that
2 I cite in block quote or -- or quote does say that,
3 basically.

4 Q. And the claims have a similar limitation about
5 selecting a first and second group -- sorry, a first and
6 second link in a single computation. Correct?

7 A. I -- yeah, I believe -- I believe that that
8 notion at a high level is -- is -- is claimed in I think
9 at least Claim 1. I think most of the independent
10 claims, but I -- I'd have to double-check.

11 Q. And the reason that the '740 patent refers to
12 a combined mapping operation is because there are
13 multiple potential combinations of ports and traces over
14 which a packet can be transmitted. Correct?

15 ATTORNEY PANETTA: Objection. Form.

16 A. Well, not -- not in all the examples given.
17 For example, in -- in Figure 3, as you're saying, you
18 know, between -- in the -- in the -- in the group 68
19 that's illustrated in Figure 3 there's only one path to
20 get to line card 1, yet there's four paths to go between
21 line card 1 and 44. But -- but again, there -- there
22 are four links between 72 and 32 in Figure 3, and -- and
23 certainly you could indicate which of those four in --
24 in -- in that -- in that computation would be selected.

25 Q. Other than Figure 3 there is no other example

1 of this sort. Correct?

2 ATTORNEY CLEMENTS: Objection. Form.

3 A. Well, if you're -- I mean, if you look at
4 Figure 5, between, you know, 72 and 32, there are three
5 lines in the group that are explicitly drawn, and
6 there's only one line to get to 101 from 72, so I'd say
7 that Figure 5 also has the situation where, although
8 there are three parallel lines between 72 and 32, within
9 32, there's only one line going to 101. So I wouldn't
10 say that Figure 3's the only figure that has that
11 situation.

12 Q. Well, in Figure 5 there are two lines coming
13 out of line cards 101 and 100, correct? To the left.

14 A. There are two lines coming out of 101 and 100,
15 but in Figure 5 only one of them is going to 72.

16 And furthermore, if you look at the
17 description of Figure 5 at column 8, starting around
18 line 31, it says: Port 64 is served by three user ports
19 24 configured as an external LAG group.

20 So it's pretty clear that the intention was
21 that there were three lines going between 72 and 73 and
22 that in this particular example given in Figure 5 there
23 are two lines going to 100 and only one line going to
24 101.

25 So that's a situation like -- like Figure 3,

1 wheres there's a line card. And I think we already
2 discussed earlier that -- that Figure 5, those --
3 those -- those -- I think 100 and 101 are line cards,
4 that there's -- there's only one line going to line card
5 101 from 72, out of which there are four lines going
6 between that line card and MUX 44.

7 Q. Just to be clear, in Figure 5, 101 is a line
8 card. Correct?

9 A. I think we discussed that earlier and it does
10 say that somewhere in the spec, as --

11 Q. And what --

12 A. -- describes it that way.

13 Q. And 100 is a line card. Correct?

14 A. Yes. We look at that earlier.

15 Q. And 72, the box shown in 72 is external to the
16 claimed apparatus. Correct?

17 A. 72 --

18 ATTORNEY CLEMENTS: Object to form.

19 A. 72 is described as external but, you know,
20 the -- the patent in -- in -- in the spec and in -- in
21 the figures, it's drawn outside the box 32. But, you
22 know, like -- like most patents, it has a catch-all,
23 like at the end of the specification, that talks about
24 the -- the embodiments described are just examples and
25 that the invention is not limited to what has been drawn

1 and that the scope -- and I'm -- I'm reading right from
2 column 10 around 50 -- Claim 58: Rather, the scope of
3 the present invention includes both combinations and
4 subcombinations of the various features described
5 hereinabove as well as variations in modifications
6 thereof which would occur to persons skilled in the art
7 upon reading the foregoing description and which are not
8 disclosed in the prior art.

9 So the figures show what they show but, you
10 know, what -- what it -- the patent talks about how
11 these aren't the only arrangements that are possible.

12 Q. In Figure 2, the multiplexer is shown as a
13 separate component from the line card, as we discussed.
14 Correct?

15 ATTORNEY CLEMENTS: Objection. Form.

16 A. Well, yeah. In Figure 2, I'd -- I agree with
17 the way it's depicted, as there's a separate box 72.
18 It's outside of box 32. And I think we looked at a
19 portion of the spec that talked about it as external.

20 But again, there -- that's just this
21 particular example embodiment. And, you know, the
22 patent talks about how you can -- there are lots of
23 different variations.

24 BY ATTORNEY STAMATOPOULOS:

25 Q. I'm talking about -- I'm talking about

1 something different. I'm sorry, I didn't mean to
2 disorient you.

3 In Figure 2, line cards 40 are shown as
4 discrete components from multiplexer 44, right?

5 A. Oh, yes. Sorry. My version, I can't see the
6 color so the annotated figure in my -- my declaration.
7 But -- but, you know, again, you don't really -- you can
8 look at the line cards as a group, and that's another
9 variation of what -- what you -- you could -- could
10 have. And it -- and which -- but the original Figure 2
11 doesn't have that box, so I -- I apologize if I, you
12 know, didn't see the colorized version in my printout.

13 Q. Okay. No worries.

14 I guess my question is from a technical
15 standpoint, what is the significance of not performing
16 the multiplexing on the line card and instead having
17 backplane traces that connect the line card to the
18 multiplexer?

19 ATTORNEY CLEMENTS: Objection. Form.

20 A. Which -- which multiplexer are you referring
21 to? Because --

22 BY ATTORNEY STAMATOPOULOS:

23 Q. 44.

24 A. Okay. And what's the significance of -- of
25 what?

1 Q. Of not performing a multiplexing function on
2 the line card and instead having multiple traces that
3 connect the line card to that multiplexer.

4 ATTORNEY CLEMENTS: Same objection.

5 BY ATTORNEY STAMATOPOULOS:

6 Q. Did that inform your opinions in any way?

7 A. Well, I mean, the multiple traces are broken
8 out as separate groups labeled 58, and -- and so --
9 and -- and I think -- I don't remember what this -- this
10 description spec said exactly about that, but -- but
11 they -- they're all internal components. As -- as we
12 saw earlier, another variation that the -- the spec
13 talks about is that a lot of things can be combined
14 together in a -- in a single component, for example.

15 And that's -- that's -- I think that was
16 referring to the control on a box in the schematic
17 labeled 60. But certainly, I think a person of ordinary
18 skill understands you can combine lots of these
19 components together in various variations as -- as
20 described, you know, at the end in -- in kind of a --
21 what's being described in the -- in what I think of as a
22 catch-all section that most patents have.

23 Q. I'd like to invite your attention to the '740
24 patent, column 1, line 66, to column 2, line 4. And
25 I'll read from the patent and then ask you a question.

1 Unlike some known network element
2 configurations in which each user port is fixably
3 assigned to a specific backplane trace, the load
4 balancing operation and embodiments of the present
5 invention enable statistical multiplexing of the frames
6 in which there is no direct relationship or connection
7 between user ports and backplane traces.

8 Do you see that?

9 A. Yes, I do.

10 Q. Do you understand the meaning of this passage?

11 A. I'm not sure what you're referring to, but
12 sure, I -- I -- I reviewed and I -- I understand the
13 '740 patent.

14 Q. How, if at all, did this particular passage
15 factor into any of the opinions that you formed in
16 connection with submitting your declaration?

17 A. Well, this is talking about how there's some
18 situations where -- where there's a fixed mapping, and I
19 wouldn't disagree with that. But there's certainly some
20 situations where there's no fixed mapping as well, and I
21 think, you know, once you go into a component and
22 there's multiple -- you know, whether it's one input or
23 more inputs and there's multiple outputs, there's still
24 no fixed mapping necessarily.

25 Q. The Bruckman prior art reference describes a

1 fixed mapping between the backplane traces and specific
2 ports. Correct?

3 ATTORNEY CLEMENTS: Objection. Form.

4 THE WITNESS: Are you referring to something I
5 said in my declaration or something Bruckman itself
6 says?

7 BY ATTORNEY STAMATOPOULOS:

8 Q. Let me -- do you have Bruckman in front of
9 you?

10 A. Yes.

11 Q. I'd like to invite your attention to Figure 2
12 of Bruckman.

13 A. Okay.

14 Q. In Figure 2 of Bruckman, there are line cards
15 labeled 34. Correct?

16 A. Yes.

17 Q. And each line card contains two concentrators
18 labeled 50. Correct?

19 A. So Bruckman does disclose that 50 are
20 concentrators. And there are several within each
21 labeled line card in -- in Figure 2.

22 Q. Now, in Bruckman there are also backplane
23 traces labeled 52 which connect each of the
24 concentrators 50 to switching board 40. Correct?

25 A. I think 52 are just described as traces,

1 not -- not -- I don't think Bruckman -- I mean, there
2 are many places where it just says "traces" and not
3 "backplane traces," as you said. But -- but 52 is
4 described as -- as a trace.

5 Q. That's fair.

6 So in Bruckman, traces 52 have a fixed mapping
7 onto specific ports. Correct?

8 A. Well, I mean, you can only say -- you can see
9 because what's disclosed inside the line card that there
10 is some other end that's distinct between the two lines.
11 But it's still showing that there's, for example, you
12 know, parallel lines going from 32 to 34 to each of the
13 34, so there's two parallel lines at that level.

14 And -- and certainly if you look inside the
15 line cards of -- of -- there's no figure, but it could
16 have a similar internal architecture that way, so I
17 don't see how this is dissimilar to what's described
18 in -- in -- in the '740 patent at all. It has just more
19 detail.

20 Q. That's not the question I asked you, though.
21 Let's try to go step by step.

22 So first of all, Bruckman does not disclose
23 the internal architecture of concentrators 50. Correct?

24 A. I mean, I don't have it memorized. I don't
25 recall what it said about 50 and what the internals

1 were.

2 Q. And what it does show is that there is a
3 single trace coming from 40 into each of the
4 concentrators 50. Correct?

5 A. Did you use the number 40 in that question?
6 Oh, from switch 40?

7 Q. Yes.

8 A. Sure, yeah. I mean, there is something going
9 from switch 40 to one of the -- each of the four
10 concentrators, and -- and -- and 52R describes as
11 traces.

12 But, for example, trace has to terminate at
13 something. If you connect two electrical traces
14 together, then there's no -- you -- you would -- you
15 could corrupt signals, and so I don't see how this is
16 any different than what's described in, for example,
17 Figure 2, where the four lines are going to the line
18 card but they're understood that they're -- they're --
19 they're not all connected together and somehow you have
20 to extract data from this munging of all the signals,
21 electrical signals on a trace.

22 So I -- I don't -- again, this is -- this is
23 similar to what's described in the '740 yet has a little
24 more detail about what's inside the line card.

25 Q. Dr. Houh, I really appreciate your inclination

1 to be helpful with your answers. And I don't want to
2 speak over you or interrupt you, consistent with your
3 counsel's request earlier.

4 What I will ask you, however, is to the extent
5 that you want to finish this deposition by 5:30, which
6 is certainly something that I would also like and I
7 think everybody else, that maybe you try to answer my
8 questions, which I've tried to keep discrete and
9 focused.

10 With that in mind -- and I don't want to tell
11 you how to answer your questions. I'm just simply
12 making a suggestion.

13 What is labeled here as switch fabric 40 is
14 connected to each of these four concentrators by a
15 single trace according to Bruckman. Correct?

16 A. If you're at that level of the internal parts
17 of the line card, that the lines do go to different
18 concentrators depicted within -- in Figure 2 in that
19 example of -- of -- of what's -- what's inside each of
20 the line cards LC1.

21 But, you know, of course, there are two lines
22 going from the switch, two -- two parallel lines going
23 to the line card 34 labeled as line card 1 and line card
24 2 separately.

25 Q. Now, the concentrator 50 upon -- let me

1 withdraw that.

2 So there's four concentrators 50 shown in
3 Figure 2 of Bruckman. I just want to invite your
4 attention to the first topmost concentrator in that
5 figure. Fair?

6 A. Okay.

7 Q. Once that topmost concentrator receives a
8 packet through trace 52, it then selects one of four
9 potential outputs. Correct?

10 ATTORNEY PANETTA: Objection. Form.

11 A. So as I describe in my declaration, I think
12 the selection of both link groups can be made at the
13 same time, but part of that value could indicate one of
14 the -- one of the outputs to a particular concentrator.

15 BY ATTORNEY STAMATOPOULOS:

16 Q. Is it your testimony here today, sir, that the
17 concentrators do not select from one of four outputs
18 denoted as 30 in Figure 2 of Bruckman?

19 ATTORNEY CLEMENTS: Objection. Form.

20 A. I don't know why you think that. What I'm
21 saying is -- is that, for example, in Paragraph 78 of my
22 declaration, I talk about -- I cite to Bruckman, where
23 it's describing the distributor 58 is responsible for
24 distributing data frames arriving from the network among
25 link 30 -- sorry, I skipped a line. Sorry, I'm -- I'm

1 looking -- I'll look at the -- so Bruckman explicitly
2 states that the hash function determines which link 30
3 receives the data frame in -- and it determines the link
4 over which to send each frame based on the information
5 in the frame header.

6 And so I -- I think as part of this
7 computation as I've described in Bruckman and I think in
8 the combination of Bruckman and -- and Basso, for
9 packets that are going from the switch towards L1, I
10 talk about how there are proper links of group 36 being
11 selected.

12 Well, there's a single computation selecting
13 groups, but then part of that is used to -- to determine
14 which link of -- of -- of groups 36 would be used.

15 Q. So let me go back to my question.

16 Do you agree or disagree that the topmost
17 concentrator in Figure 2 of Bruckman selects one of four
18 output links 30?

19 I'm just asking you based on your -- what
20 you've, you know, testified here today.

21 ATTORNEY CLEMENTS: Objection. Form.

22 A. I think you said the -- the concentrator
23 selects, but what I cite to are portions of the spec
24 about the distributor responsible for distributing
25 frames, and it determines the link over which to send

1 each frame.

2 And so, I mean, I don't -- I don't think I
3 say -- I mean, maybe you can point me -- point me to a
4 portion of my spec. I don't think I'm saying it's the
5 distributor that is actually making the selection.
6 There's some selection being made that the -- the 50 is
7 just using which one based on the decisions that's made.

8 And I think in the combination I describe
9 another -- you know, when I talk about the combination
10 with Basso, that -- that also describes, I think,
11 separating the hash function into different bits as
12 taught -- if you -- I don't -- let's see. You can look
13 at my declaration for that, the rest of this section.

14 BY ATTORNEY STAMATOPOULOS:

15 Q. Let me just ask this.

16 So based on what you're reading right now in
17 your declaration and what you're reading from Bruckman,
18 is it your testimony as you sit here today that the
19 concentrator does not select one of the links 30?

20 A. I -- I mean, you -- the concentrator does
21 appropriately put the -- you know, transmit the frame on
22 the appropriate link 30.

23 But if -- if you're asking what -- whether
24 it's the one making the selection, the -- the -- the
25 portions that I cite to are talking about this other

1 item, the distributor.

2 Or it's just a hashing function that's -- and
3 there is a distributor 58. And clearly, one of the
4 links -- the whole point of this is to figure out
5 which -- one of the points are -- is, of Bruckman, is to
6 figure out which set of -- which one link to use for the
7 transmission for a particular frame.

8 And Bruckman describes a whole method it uses.
9 Whether -- I mean, I think whether you're -- you're --
10 I'm saying it's the device 50 that actually does this
11 computation. I don't think I talk about that anywhere
12 except to -- to talk about the distributor, which is
13 responsible for distributing data frames.

14 And then there are portions of the spec that
15 talk about the distributor determining the link over
16 which to send each frame.

17 Q. That's what you've said in your declaration in
18 Paragraph 78?

19 A. I mean, I do cite part of the spec that --
20 that -- that says that in --

21 Q. So --

22 A. -- 78.

23 Q. So that's what you've said in Paragraph 78 of
24 your declaration, citing to portions of Bruckman.

25 Correct?

1 A. Yes.

2 Q. I want to take you now to -- and let me ask
3 you this.

4 So based on what you've said in Paragraph 78
5 of your declaration, do you disagree that the
6 concentrators 50 select from one of four output links
7 30?

8 A. I guess it means -- depends what you mean by
9 "select." I mean, certainly the concentrators will --
10 will distribute a frame appropriately onto one of the
11 links.

12 Q. "Select" is a term that's used in the claims
13 of the '740 patents. Correct?

14 A. Well, for example, the method step of -- of
15 step 1 comprises selecting, which -- which is -- I -- I
16 don't know which element, the fourth element. But --
17 but nothing -- nothing in the language I'm looking at
18 there says what has to make the selection. Simply it's
19 a method where selecting is one of the method steps.

20 Q. In any event, "selecting" is -- is a word
21 that's used in the claims. Correct?

22 A. Yes.

23 Q. And in addition to being one of the words that
24 is used in the claims, in page 22 of your declaration
25 you have devoted three paragraphs, 34 through 36, in

1 discussing the term "selecting in a single computation."
2 Correct?

3 A. Yes. That's more than just the word
4 "selecting," though. It -- it's -- it's about selecting
5 in a single combination -- computation.

6 Q. And you were careful in drafting your
7 declaration in the manner in which you used the word
8 "select." Correct?

9 A. I -- I generally try to be, but there may be
10 some times where I use a common word that happens to
11 be -- just without necessarily adopting that same
12 meaning that I might when I'm talking about the actual
13 claim and doing the mapping.

14 As you -- as you know, there are lots of very
15 common words that are used in claims, and I'd have to
16 look at the context of where I use those words to -- to
17 make sure what the context is.

18 Q. So let's look at how you use the word "select"
19 in the context of Paragraph 41 of your declaration.

20 A. Okay.

21 Q. Sixth line from the top, you state: Bruckman
22 thus describes a two-level multiplexing/demultiplexing
23 structure in which the first level includes the
24 concentrators 50, each of which selects from one of four
25 outputs (links 30) and the second level includes

1 switching core 40, which selects one of a plurality of
2 outputs (traces 52).

3 Do you see that?

4 A. Yes, I see that.

5 Q. Your words?

6 A. Yes.

7 Q. Do you disagree with them?

8 A. No. I -- I stand by what I said there.

9 Q. What is a single computation?

10 A. So I described that in this section because
11 that's really the focus of -- of this. And, by the way,
12 the -- I use the word "selects," but later on in the
13 paragraph after that I talk about the selecting as -- as
14 described in Bruckman.

15 You can look at that later if you want. But,
16 for example, in Paragraph 35 I talk about how, because
17 the claim selecting process involves multiple steps as
18 claimed and as described in the specification, a POSITA
19 would have understood the term "selecting in a single
20 computation one of two ways," and then I go on to
21 describe these two ways.

22 Q. Regardless of which of two ways a POSITA might
23 interpret "a single computation," is it fair to say that
24 "a single computation" according to the claims of the
25 '740 patent refers to the selection of both a first and

1 a second physical link?

2 A. I mean, the claims require what they require,
3 which in that step require selecting in a single
4 computation based on at least one of the frame
5 attributes a first physical link out of the first group
6 and a second physical link out of the second group. So
7 that's what the claim requires.

8 Q. Now, would a prior art reference meet this
9 limitation if it taught only one selection that was a
10 product of a single computation?

11 ATTORNEY CLEMENTS: Objection. Form.

12 A. I think regardless of which way it's
13 interpreted, as cited, does render this element obvious.
14 And I lay that out in -- I think in various sections,
15 including this Bruckman section we're looking at,
16 starting around --

17 Q. Is it the basis for your opinions that these
18 prior art references disclose two selections of physical
19 links, both of which are the product of a single
20 computation?

21 ATTORNEY CLEMENTS: Objection. Form.

22 A. I didn't really finish the last answer,
23 which -- which I was looking for what I referred to.
24 But in the section -- the sections of my declaration
25 are -- with respect to element 1.6, which -- and -- and

1 so it's the selecting here, for example, where -- where
2 Bruckman describes a hashing function in -- in
3 Paragraph 78. And then alternatively in Paragraph 81
4 there -- there may be some other, you know, discussion
5 as well. But that's where I talk about the selecting.

6 And certainly, those concentrators and the
7 switch can use the results of that selecting using the
8 hash function to make it so -- you know, as how it
9 selects. But what I was really talking about there
10 was -- is I talk about this hash function, which is --
11 which I actually talk -- I think I used the word
12 "selecting" with respect to -- to that.

13 So I saw it somewhere just now. And -- and
14 then -- and then the -- the -- I think in 81 I talk
15 about how that selecting of a link 30 also determines
16 which trace 52 will transmit the data frame and that --
17 and other discussion with respect to element 1.6 in my
18 declaration.

19 Q. Let me shift gears for a second.

20 So you've worked in a number of different
21 companies over the course of your career, right?

22 A. Yes.

23 Q. And you're familiar with the notion that
24 technology companies release different product versions,
25 right?

1 A. Sure.

2 Q. And oftentimes, these different product
3 versions will constitute improvements over previous
4 product versions, right?

5 A. Sometimes. Sometimes they remove features as
6 well, but I -- you know, but certainly some of them
7 would constitute improvements.

8 Q. Now, you have studied the Bruckman prior art
9 reference, which is a key part of your declaration.
10 Correct?

11 A. Yes.

12 Q. And do you know who the assignee is for the
13 Bruckman prior art references?

14 A. It says Corrigent Systems.

15 Q. Does that ring any bells?

16 A. Sure. I mean, the -- the '740 patent is also
17 on its face assigned to Corrigent Systems. I understand
18 there's a whole bunch of name changes. I'm not keeping
19 track of all that. But at least on the copy I have, it
20 says Corrigent Systems, Ltd.

21 Q. At the time that you wrote your declaration
22 were you aware that the '740 patent and the Bruckman
23 prior art reference were assigned to the same assignee,
24 Corrigent Systems?

25 A. Yeah, I mean, I think it's possible. I often

1 look at these things. I don't remember what -- you
2 know, when I first realized that. It could have been
3 back then.

4 Q. Did it matter to you at all in forming your
5 opinions?

6 A. I'm not sure it has a big impact, if -- if --
7 if any. I -- I -- certainly, I think there's -- there
8 is the -- you know, if -- if a -- if a patentee has --
9 has knowledge of a prior art that materially impacts --
10 materially impacts the patentability of a patent, I
11 think they're under -- they have a duty to disclose
12 that. Now, I'm not a lawyer. That's just what I
13 understand.

14 Q. I'm not asking for your legal opinion about a
15 patentee's duty to disclose. Rather, what I'm asking
16 you as a technical person that's called upon to analyze
17 the validity or invalidity of claims of an issued patent
18 if it mattered to you that the main prior art reference
19 that you relied upon was issued to the same assignee.

20 Did it matter to you one way or the other?

21 ATTORNEY CLEMENTS: Objection. Relevance.

22 A. I'm not sure it has an impact on -- on the
23 patentability analysis because it's still prior art. It
24 was -- you know, it was -- it was published, you know --
25 you know, before the '740 patent was -- was filed.

1 And I understand that -- that -- I mean, I
2 don't know what the legal requirements are, if -- if
3 there are any with respect to the same one, but I think,
4 you know, it -- it would have been more -- you know, a
5 company should know its own patents, so that's why I
6 raised the disclosure issue.

7 BY ATTORNEY STAMATOPOULOS:

8 Q. You haven't addressed the commonality of
9 assignees between Bruckman and the '740 patent in your
10 declaration, have you?

11 A. I don't think I addressed that. I don't -- I
12 don't know if that's a legal issue, may have been
13 addressed in the petition. But I, you know, I was -- I
14 was analyzing the -- the reference as a prior art
15 reference.

16 Q. And that particular context did not matter to
17 you. Correct?

18 A. Well, it would have mattered if -- if this was
19 part of the priority chain or something of -- of the
20 patent at issue, of the challenged patent. But I don't
21 think that was the case. So I -- I -- I generally look
22 at those types of things as well.

23 Q. Do you agree that the switching port 40 in
24 Bruckman is what selects one of the traces 52?

25 A. I mean, in -- in that sense where I said that

1 in my declaration somewhere, it's simply -- it's -- it's
2 meant to describe the -- the process, because it -- it
3 clearly has to -- one of them has to be used, and so
4 it's simply using one.

5 But I do talk about selecting as a -- with
6 respect to the claim language, with respect to
7 performing the hashing function, for example.

8 Q. Let's -- let's go to Paragraph 42 of your
9 declaration where you discuss the hashing function of
10 Bruckman. You have annotated the disclosure of Bruckman
11 with letters A, B, and C.

12 True?

13 A. Yes, that's right.

14 Q. And you discuss what the different segments of
15 code, annotated as A, B, and C, do in Paragraph 43 of
16 your declaration. Correct?

17 A. Sure, yes.

18 Q. Does line -- so just a background question.
19 The hashing function has certain inputs to it.
20 Correct?

21 ATTORNEY CLEMENTS: Objection. Form.

22 A. Sure.

23 BY ATTORNEY STAMATOPOULOS:

24 Q. What are the inputs to the Bruckman hashing
25 function?

1 A. In this particular example given in -- in
2 Table 1, the input to this particular hashing function
3 is a pointer to the header and a number that represents
4 the size of the lag, the lag size.

5 Q. Any other inputs to the Bruckman hashing
6 function that you can see in Bruckman Table 1 listed on
7 page 27 of your declaration?

8 A. Well, I mean, there's a pointer to the header,
9 so the -- the -- the function actually uses the header
10 as pointed to. So yes, I suppose. I mean, it's not an
11 explicit input, but the value pointed to by the header,
12 some of values are used in the -- in the -- in the
13 function of the -- in performing the computation.

14 Q. And just to be clear, this is the only
15 specific example of a hashing function that is described
16 in Bruckman. Correct?

17 A. Well, I mean, Bruckman lays out some criteria
18 that a hash function should satisfy, and then it gives
19 this as -- as one way to implement the hash function.

20 So, I mean, it might be the one example
21 listed, but there are certainly -- Bruckman's describing
22 criteria that -- that the hash function should meet,
23 however it's implemented.

24 Q. What are Bruckman's criteria?

25 A. So if you look at --

1 ATTORNEY CLEMENTS: Objection. Form.

2 A. -- what it says in Paragraphs 59 through 62
3 and -- and 58, it -- it -- it says: The criteria that
4 are explicitly listed are that the hash value output by
5 the function is fully determined by the data being
6 hashed so that frames with the same header will always
7 be distributed to the same link. That's Paragraph 59.

8 Paragraph 60 is: The hash function uses all
9 the specified input data from the frame headers.

10 61: The hash function distributes traffic in
11 an approximately uniform manner across the entire set of
12 possible hash values.

13 And 62: The hash function generates very
14 different hash values for similar data.

15 BY ATTORNEY STAMATOPOULOS:

16 Q. Any other criteria that Bruckman discloses in
17 connection with its hashing function?

18 A. I think that's all I see explicitly listed
19 there in -- in Paragraphs 59 through 62.

20 Q. Now I'd like to turn your attention back to
21 the example hash function from Bruckman. Okay if I
22 refer to that as the Bruckman hash function?

23 A. I mean, it's referring to any set of functions
24 that meets the criteria. But sure, if you want to refer
25 to it that way.

1 Q. I'll refer to the Bruckman hash function as
2 the example that Bruckman offers of a hash function.

3 Is that fair?

4 A. Okay.

5 Q. So the Bruckman hash function is excerpted
6 here in your declaration under Paragraph 43. And we
7 talked a little bit about the inputs to that hash
8 function.

9 Can you describe for me the outputs, if any,
10 of this hash function?

11 A. Well, the -- the return value is hash modulo
12 lag size, so that's the last -- that's the -- that would
13 be considered the output.

14 Q. What is the meaning of that output?

15 A. That's the return value. So it's described as
16 an unsigned short. It could be one of any -- you know,
17 a -- a -- some number. But what it -- what it does is
18 it -- it -- it takes the hash value and modulo the --
19 the lag size returns the remainder when you divide the
20 hash value by the lag size.

21 Q. And so is it your testimony that the output of
22 the Bruckman hash function is a modulo of the division
23 of the hash key and the lag size?

24 A. Yeah. I mean, that's what it says, and
25 that -- that would be a value from zero to lag size

1 minus 1.

2 Q. And then in Paragraph 43, you state: This
3 final single modulo value is then used to select which
4 link 30 will transmit the data frame, right?

5 A. Yes. I think that's at the end of
6 Paragraph 43.

7 Q. You don't have any citations to Bruckman in
8 support of that opinion. Correct?

9 A. Well, I -- I mean, if you are asking if
10 there's a explicit citation after that sentence, no,
11 there's not.

12 Q. Do you know if there's any other inputs that
13 Bruckman uses to select a port for a link 30 to transmit
14 a data frame?

15 A. Well, I don't remember all of Bruckman
16 offhand, but I -- I don't see anything I'm discussing
17 otherwise here in this section.

18 Q. Right.

19 A. I go on to talk about the combination of Basso
20 and Bruckman as well, but in --

21 Q. Right.

22 A. -- the --

23 (Simultaneous speaking)

24 BY ATTORNEY STAMATOPOULOS:

25 Q. We'll get to Basso. I guess what I'm asking

1 here is like there's no indication in the Bruckman hash
2 function of an output that is expressly referred to
3 as -- let me withdraw that question.

4 Bruckman does not describe how the output of
5 its hash function is used to select a link 30, does it?

6 A. I -- I mean, I don't remember all of Bruckman,
7 but it certainly would have been understood that like if
8 the -- if the LAG groups are a size LAG group and the
9 output is a value that -- that can be used to determine
10 which link within the LAG group to use, I mean, I think
11 a person of ordinary skill would have understood that.
12 I don't -- that -- that -- that -- this value could be
13 used to -- to select or to -- to perform, you know,
14 to -- to pick something from a set that's of -- of size
15 LAG group. And hence, certainly within the context of
16 the spec where it talks about using hash functions and
17 the distributor and whatnot, I -- I don't -- I -- I
18 don't know that it matters to a POSITA exactly what
19 words I use to describe that, but I think it's something
20 they would have understood.

21 Q. What's your basis for that opinion?

22 A. I mean, there's lots of citations to Bruckman
23 that -- that talk about this process and the hash
24 function. I mean, we can look through Bruckman and
25 through my declaration if you want. I'll do that.

1 Q. Let's move on. Have you found something?

2 A. In this Paragraph 75, it says: Distributor
3 58 -- I'm -- I'm reading the highlighted section --
4 determines the link over which to send each frame based
5 on information in the frame header. Preferably,
6 distributor 58 applies a predetermined hash function to
7 the header information.

8 And so it's -- it's saying that that's how
9 distributor 58 determines the link to -- over which to
10 send each frame. So it might not use the words exactly
11 as you asked them, but right there it's teaching that
12 the hash function's used to determine the link over
13 which to send each frame. And it's based on information
14 in the frame header, which is entirely consistent with
15 the code fragment example we have been looking at.

16 Q. Let's me ask you this.

17 Isn't it possible that the distributor decides
18 which set of links 40 a frame will be transmitted over
19 and then the concentrator will determine exactly which
20 of those links should be used, consistent with what
21 you --

22 ATTORNEY CLEMENTS: Objection. Form.

23 Q. -- with what you put in your declaration?

24 A. I mean, it doesn't say the distributor 58
25 term -- determines the link group over which to send.

1 It says distributor -- I'm looking in Paragraph 75
2 again. Bruckman says: Distributor 58 determines the
3 link over which to send each frame based on information
4 in the frame header.

5 So I don't think that's describing the
6 situation you're -- you're asking about. Could it? I
7 mean, maybe somewhere else it talks about that. But
8 here, it's not talking about that. This is talking
9 about determining the link, not which link group to
10 select, to -- to -- that will be to which this frame
11 should be sent. It's talking about the link over which
12 to send each frame.

13 Q. Is trace 52 a link in Figure 2 of Bruckman?

14 A. Again, what we said -- what -- what we talked
15 about earlier is -- is 52 is described as a trace, and
16 actually, 30 are described as a link.

17 But if you determine which link -- and -- and
18 I talk about this -- which the distributor determines
19 which link to use, and because the link groups are
20 connected to one of the traces, that also determines the
21 trace. And I talk about that in -- in my declaration.

22 But again, the -- the -- the -- the cite --
23 cited passage from -- from Bruckman in -- in my
24 Paragraph 75 says the distributor 58 selects the link,
25 or -- or determines the link over which to send each

1 frame based on information in the patent header.

2 Q. So that passage from Bruckman which says that
3 distributor 58 determines the link over which to send
4 each frame based on information in the frame header,
5 that doesn't actually say that the link determined by
6 the distributor is a link 30, right?

7 It doesn't say 30. Am I right?

8 A. It doesn't use the link 30 there, but in the
9 immediately previous sentence, it talks about aggregator
10 54 comprises a distributor 58 which is responsible for
11 distributing data frames arriving from the network among
12 links 30 in aggregation group 36.

13 Q. I understand that.

14 But in -- in that sentence where it says the
15 distributor determines the link, it just doesn't use the
16 number 30.

17 Fair?

18 A. That's fair. It -- that --

19 Q. All right.

20 A. -- says what it says. I'm -- I'm not going to
21 insert numbers, but it's pretty clear to a POSITA
22 what -- what it is.

23 Q. Okay. We're going to -- we're just going to
24 take it step by step. I'm just going to ask you very,
25 very simple questions, and I'd like straight answers to

1 my questions.

2 The backplane trace -- or, sorry, the trace
3 52, is that a link or not in Bruckman?

4 A. It's described as a -- as a trace, but it
5 certainly, you know, enables communications between the
6 devices at the ends of -- of the trace, depicted in the
7 ends of the traces. So in that sense, it -- it -- it,
8 you know, it -- it could be considered. But it's --
9 it's described as a trace in Bruckman.

10 Q. It could be considered what? A link?

11 A. It's not described as a link, but it could be
12 considered to be a link that -- that allows
13 communication to pass from one element to another
14 element, such as -- as -- but it's described as a trace.

15 Q. So given that trace 52 could be considered a
16 link, and that in Paragraph 58 of Bruckman there is no
17 explicit reference to which link distributor 58
18 determines, how do you know that it is not the
19 distributor that determines the trace and then the
20 concentrator that determines link 30, as you put in your
21 declaration where you stated that the concentrator
22 selects the link 30?

23 How do you know that?

24 A. So you're -- you're twisting my words a little
25 bit. So you -- you asked me questions. I'm giving you

1 straight answers. But the spec itself talks about --
2 about -- about the distributor, which is responsible for
3 distributing data frames arising -- arriving from the
4 network among links 30, and that the distributor
5 determines the link over which to send each frame based
6 on information in the frame header.

7 And a person of ordinary skill understands
8 that in this context, they're talking about -- they're
9 not talking about trace 52, you know, is what I had --
10 what I just -- the question about the traces being links
11 is that -- sure, that's -- that's still possible, but
12 the -- but the words being used in Bruckman here are --
13 are pretty specific. And in the context of this, it --
14 it -- it seems pretty clear to me. And, you know,
15 again, a person of ordinary skill doesn't look at one
16 sentence in isolation from the entire spec and -- and
17 then, you know, tries to hyper literally interpret that
18 one -- one sentence in absence of the context.

19 This is a paragraph from Bruckman, and it's in
20 the context of how the paragraph reads. It talks about
21 the links 30. The next sentence doesn't use the number
22 30. I give you that. But it's pretty clear in context
23 what it means.

24 Q. I think you're not speaking into the
25 microphone, by the way, just so you know.

1 A. Right. I think it's pretty clear in context
2 what it means.

3 THE WITNESS: By the way, we've been going
4 about an -- over an hour and a half.

5 ATTORNEY STAMATOPOULOS: Let's take a break.

6 (Recess taken.)

7 BY ATTORNEY STAMATOPOULOS:

8 Q. Welcome back, Dr. Houh. So I would like to go
9 back to your declaration, Paragraph 44.

10 A. Okay.

11 Q. You state: Accordingly, Bruckman shows that
12 using a set of parallel traces and a set of parallel
13 links/ports to transmit packets was known before the
14 filing of the '740 patent.

15 Do you see that?

16 A. Yes.

17 Q. What's your basis for saying that Bruckman
18 shows a set of parallel traces?

19 A. I mean, the diagram of -- of Bruckman is very
20 similar to the examples given in the -- in the '740
21 patent itself.

22 For example, if you look at Figure 2, it's got
23 this one -- you know, it's got a fan-out of four, in
24 this case traces in Bruckman, to various -- to line
25 cards so that there's a set of parallel traces to each

1 line card, set of two parallel traces to each line card.
2 And then from each line card, there's a fan-out of --
3 of -- of, in this case, 8.

4 But if you look at the '740 patent, there's
5 a -- there -- there are four line cards. In this case,
6 there are two line cards in Bruckman, but there -- in --
7 in -- in both examples there -- there are exactly 16
8 outputs.

9 It's organized slightly differently, but there
10 are parallel line -- there are multiple line cards.
11 There are parallel links to each of the two line cards
12 depicted in the example of Bruckman in -- in Figure 2.

13 And -- and while -- while there's -- while
14 there's 8 links coming out of each line card in
15 Bruckman, there are these -- internally, there are these
16 distributor units, each with have -- which have four.
17 So it kind of goes, you know, going from a set of four
18 in -- in a first group to a -- a -- to as many as 16,
19 but 16 different outputs.

20 And -- and there -- they may be grouped
21 slightly differently. I think 36 in Bruckman is a -- is
22 a group, but -- but it -- it -- it -- and the
23 description as I've analyzed is -- it -- it basically
24 renders obvious the challenged claims.

25 Q. So just to be clear, the different line cards

1 in Bruckman each corresponds -- let me withdraw that.

2 Just to be clear, each of the traces in
3 Bruckman corresponds to a different set of ports.
4 Correct?

5 A. I mean, the terminology between the two
6 patents is -- is slightly different, the Bruckman and
7 the -- the '740 patent, so they don't use necessarily
8 the same words in the same places.

9 But nevertheless, they now -- my analysis, if
10 you look at my declaration, shows that -- shows why --
11 why I -- formed the basis of my opinions to show why I
12 believe that the challenged claims are unpatentable
13 because they're -- they're obvious over the prior art.

14 So if you want to refer me to a specific place
15 in my analysis we're talking about ports, and -- and
16 because the ports in the '740 are slightly different
17 than the way port is used in Bruckman, I'd want to look
18 at what you're specifically asking about that I'm
19 saying.

20 Q. Let me ask you a specific question.

21 Bruckman refers to links 30. Correct?

22 A. Yes.

23 Q. And Bruckman refers to traces 52. Correct?

24 A. Yes.

25 Q. And these were all shown in Figure 2 of your

1 report. Correct?

2 A. The annotated Figure 2 in -- at the end of
3 Paragraph 41, I labeled those that -- that way using the
4 language in Bruckman.

5 Q. Great, great.

6 So my question to you is: Each of the traces
7 52 in Bruckman corresponds to a different set of ports
8 than every other trace in Figure 2 of Bruckman.

9 Correct?

10 A. Well, as -- as depicted, that's the -- there's
11 still parallel traces between, you know, switch 40
12 and -- and line card 1 labeled 34, the upper line card.
13 But there is a correspondence between a link, a
14 particular link 30, and a particular trace in -- as
15 depicted in Figure 2, in that example, Figure 2.

16 Q. Let me ask you the question a different way.

17 Is there any trace that you can identify in
18 Figure 2 of Bruckman that corresponds to the same links
19 30 as any other trace 52 in Bruckman?

20 A. Sorry, could you repeat that question, please?

21 Q. Is there any trace 52 in Bruckman Figure 2
22 that corresponds to the same links 30 as any other trace
23 52 in Bruckman Figure 2?

24 A. In the particular example given in Figure 2,
25 the -- the -- the traces 52 each correspond to a set of

1 links 30, which -- which are entirely disjoint from
2 other traces' links. That's just in this example.

3 But if you look at the line card level and you
4 didn't know what the internal architecture was, you
5 know, you -- we can -- we can say that for this example
6 because we do see what they've labeled internally.

7 Q. Right. Bruckman shows that each line card
8 actually contains two concentrators, right?

9 A. In this example, it does.

10 Q. You also have analyzed another prior art
11 reference, Basso. Correct?

12 A. Yes.

13 Q. Basso, like Bruckman, describes a two-level
14 structure. Correct? As stated in Paragraph 45 of your
15 declaration.

16 A. Yes, that's what I say.

17 Q. And is it fair to say that the first level
18 lines map onto the first group of physical links recited
19 in the '740 patent, according to your declaration?

20 ATTORNEY CLEMENTS: Objection. Form.

21 THE WITNESS: Where are you looking at my
22 declaration you're referring to?

23 BY ATTORNEY STAMATOPOULOS:

24 Q. Paragraph 46.

25 A. I think you said "first level lines" in your

1 question, but I -- I don't see where I'm saying that in
2 my Paragraph 46.

3 Q. Okay. So you have Basso Figure 4 annotated
4 right above Paragraph 46. Correct?

5 A. Yes.

6 Q. What do you mean by -- the annotations are
7 yours, right?

8 A. Yes.

9 Q. The first level lines, do they correspond to a
10 first set of physical links?

11 A. I mean, I do say in 46 that there is a first
12 level lines -- sorry, a first group of physical links,
13 each associated with each of the -- one of the ports
14 404. And -- and I think that does correspond to the
15 above figure labeled first level lines.

16 Q. Okay. And now you also say: Additionally, a
17 second set of links connects each of the blades to the
18 switching fabric.

19 Do you see that?

20 A. Yes.

21 Q. Is it fair to say that the second level lines
22 marked in green in the figure above correspond to the
23 second set of links that connect each of the blades to
24 the switching fabric?

25 A. Yeah. I mean, I think that is what I'm saying

1 here. And the use of the labels first and second here's
2 just to distinguish between the two sets. But -- but
3 yes, so I -- I do indicate in the -- in the -- in the
4 annotation the second several lines are those that
5 connect the switch fabric to the blades, as I discuss in
6 Paragraph 46.

7 Q. I want to take you to Claim 17 of the '740
8 patent.

9 A. Okay.

10 Q. And Claim 17 recites: An apparatus for
11 connecting a network node with a communication network
12 comprising -- and now this is the limitation that I want
13 to direct your attention to -- one or more interface
14 modules which are arranged to process data frames having
15 frame attributes sent between the network node and the
16 communication network, at least one of said interface
17 modules being operated to communicate in both an
18 upstream direction and a downstream direction.

19 Do you see that?

20 A. Yes.

21 Q. And then right after that, it says: A first
22 group of physical links arranged in parallel so as to
23 couple the network node to one -- to the one or more
24 interface modules.

25 Do you see that?

1 A. Yes.

2 Q. Fair to say that the first group of first
3 physical links map onto the first level lines that you
4 annotated in Basso?

5 ATTORNEY CLEMENTS: Objection. Form.

6 A. I mean, my analysis doesn't -- I'm not
7 depending on Basso for this element. I'm depending on
8 what's disclosed in Bruckman. So again, I'm use -- I
9 happen to -- I'm using the labels first and second, but
10 that's not to say that's what I'm mapping to things in
11 this claim element. It's just a label to distinguish
12 the two groups.

13 But what I'm mapping to this element, if we
14 look in -- I think -- I think this is 17.3, refers to my
15 analysis in 1.1, which is about the -- the Bruckman
16 and -- and how it maps. So it's -- it's -- it's
17 Bruckman that I'm depending on. I haven't done --

18 BY ATTORNEY STAMATOPOULOS:

19 Q. Yeah, but I'm not --

20 A. This is not --

21 Q. -- asking you that question. I'm asking you a
22 different question. But in any event, let's proceed as
23 you wish.

24 So you're using Basso to show that there is a
25 single computation for the selection of a first and

1 second set of links, right?

2 ATTORNEY STAMATOPOULOS: Incidentally,
3 counsel, given the time it's taking Dr. Houh to answer
4 my question because he's not answering my questions,
5 actually, so given the time it's taking him not to
6 answer my questions, I think I'll reserve the right to
7 go beyond 5:30.

8 ATTORNEY CLEMENTS: Well, I -- I don't think
9 his questions are -- his answers are unreasonably long
10 or unreasonably delayed. I mean, I see no reason to
11 extend the deposition beyond the seven hours that --
12 that you're entitled to.

13 ATTORNEY STAMATOPOULOS: I mean, on what basis
14 are you suggesting that I'm not entitled to go beyond
15 that?

16 ATTORNEY CLEMENTS: Well, it's my
17 understanding of the PTAB rules is that you're entitled
18 to seven hours of deposition time.

19 ATTORNEY STAMATOPOULOS: Is it your
20 understanding that under the PTAB rules the witness can
21 answer different questions than the ones -- than the
22 ones I'm asking?

23 ATTORNEY CLEMENTS: I don't think that's a
24 fair characterization of what's going on. I think the
25 witness is doing his best to give full and complete

1 answers to your questions. I mean, if you want to
2 petition the Board for additional time, you're welcome
3 to do that, but we're going to be stopping the
4 deposition after seven hours on the record.

5 ATTORNEY STAMATOPOULOS: Okay. And we'll
6 reserve the right to -- given the exchange that we have
7 had right now, we'll reserve the right to petition the
8 Board for additional time, and we'll produce transcripts
9 of -- as well as -- as well as the timestamps for the
10 different answers and -- and we'll see what the Board
11 determines.

12 ATTORNEY CLEMENTS: All right.

13 ATTORNEY STAMATOPOULOS: Great. So would the
14 court reporter -- actually, I don't think there's a
15 question pending.

16 BY ATTORNEY STAMATOPOULOS:

17 Q. So you relied on Basso, if I understand
18 correctly, for the limitation that a first and second
19 group of links are selected in a single computation.
20 Correct?

21 A. So I -- I believe that that is -- I -- I do
22 rely on that as an alternative. There's two grounds.
23 One, that's Bruckman alone. And there's a second
24 ground, which is Bruckman in -- in light of Basso. And
25 so in that -- you know, where -- where I'm making a

1 combination of Bruckman and Basso, it is -- it is for
2 the analysis of the element, I think it's 1.6, and -- is
3 it 1.6?

4 Q. Let me direct your attention to Paragraph 51
5 of your declaration.

6 A. 51?

7 Q. Yeah.

8 A. Okay.

9 Q. You state: As explained above, Basso's
10 network device used just one hash value to select an
11 appropriate blade/port combination to transmit the
12 received packet of data.

13 Do you see that?

14 A. Yes.

15 Q. Then you say: Basso thus uses a single hash
16 computation to select a blade/port combination.

17 Do you see that?

18 A. Yes.

19 Q. Both a first level line (one of the ports) and
20 second level line (one of the blades).

21 Do you see that?

22 A. Yes.

23 Q. Is it your opinion that the blades in Basso
24 are links?

25 A. Well, I -- I mean, I -- I talk about the

1 issues about why -- there are many reasons why a person
2 would -- would be motivated to combine them. They're --
3 they're -- they're similar like two-level hierarchies,
4 as -- as I've said. But -- but I think maybe part of
5 the issue here might be that the labels that I used when
6 we were looking at the first and second on the -- at the
7 end of Paragraph 45 -- sorry, what paragraph were you
8 referring to just now?

9 Q. Just now? 51.

10 A. 51? Okay, so 51. Looking for that. Oh, here
11 it is, where I talk about the first level line 1 of the
12 ports would be -- would be -- oh, yeah, so it's first
13 level lines one of the ports here and second level line
14 one of the blades, so that is -- that is consistent with
15 the figure.

16 But it's -- it's -- what I'm combining,
17 though, is this -- the hash -- what -- what Basso talks
18 about with respect to the computation. And I talk about
19 that in Paragraph 81 and 82 and 83 about that
20 computation. So it's -- it's the computation to select
21 links from two groups from the combination of Bruckman
22 and Basso. That's -- that's the combination.

23 But yeah, I mean, Basso also has two levels
24 of -- of -- of items. But I'm not depending, I don't
25 think, on anything in Basso being a link because I think

1 that that is what I'm relying on Bruckman for.

2 ATTORNEY STAMATOPOULOS: Would the court
3 reporter repeat my last question, please? I'm sorry,
4 you haven't answered my question, so I'm going to ask
5 the court reporter to repeat my last question.

6 (The reporter read from the record.)

7 A. I -- I'm not depending on any mapping of
8 blades to any claim links here, but no, I -- I don't
9 think I said that anywhere in my declaration.

10 BY ATTORNEY STAMATOPOULOS:

11 Q. So it's not your opinion that the blades in
12 Basso are links. Correct?

13 A. I -- I don't think I said that anywhere in my
14 declaration. I don't have it memorized, but that's --
15 that's not -- any mapping to links, I -- I believe I
16 depended on Bruckman for. And there's not a -- I don't
17 believe I said anything about blades and links for
18 Basso's mapping to any of the claims.

19 Q. Okay. Now, in Paragraph 46 of your
20 declaration, you state: A switch fabric 401 configured
21 to direct the incoming packets of data to particular
22 blades coupled to switch fabric 401.

23 Do you see that?

24 A. Yes, I see that.

25 Q. Fair to say that switch fabric 401 determines

1 which blades packets will be directed to as they come
2 into the device shown for Figure 4 right above
3 Paragraph 46 of your declaration?

4 A. I mean, this is the background section of
5 Basso. I'm not intending here to map anything I
6 describe here to elements of the -- the challenged
7 claims, so -- but, I mean, I stand by what I wrote here.
8 I'm not, you know, denying anything that I say here. It
9 says what it says.

10 Q. Do you know which component in Basso
11 determines which ports packets are routed to?

12 A. I do see in Paragraph 43 that using that
13 single hash value, Basso's network device selects an
14 appropriate blade/port combination. May be identified
15 to transmit the received packet of data, and part of
16 that's a -- a -- a quote directly to the Basso
17 specification.

18 Q. Fair to say that -- let's turn to Basso. Let
19 me withdraw the question. Let's turn to Basso,
20 Figure 5.

21 A. Okay.

22 Q. Fair to say that Figure 5 is a flow chart of
23 one embodiment of the inventions disclosed in Basso?

24 A. I mean, it's describing the spec as a flow
25 chart of a method for routing packets implementing

1 logical interfaces in accordance with the present
2 invention.

3 Q. Yeah. Now, the hash function is performed at
4 step 504, correct, in Figure 5 of Basso?

5 A. I mean, 504, the box says: Performing a hash
6 function on packet header to generate a hash value.

7 Q. Right. And then in -- in Paragraph 41 of
8 Basso, it says: In step 504, a hash function may be
9 performed on the received packet to generate a hash
10 value.

11 Do you see that?

12 A. Wait. Sorry, where were you looking there
13 again?

14 Q. In Paragraph 41 of Basso, it says: In step
15 504, a hash function may be performed on the received
16 packet to generate a hash value.

17 Do you see that?

18 A. Yes.

19 Q. Okay. And then following that, there's the
20 section that I think you relied on in Paragraph 43 that
21 says: The table associated with a particular logical
22 interface 405 may comprise a plurality of entries which
23 each entry may comprise -- where each entry, sorry, may
24 comprise a threshold value associated with a particular
25 blade/port combination.

1 Do you see that?

2 A. Paragraph 43, yes, I see that.

3 Q. And I think you've opined that the hash value
4 generated at step 505 as described in Paragraph 42 is
5 what's used to identify a blade/port combination.
6 Correct?

7 A. I do talk about that, but there are other
8 paragraphs that say very similar things that I've cited
9 to, I think, like Paragraph 12.

10 Q. Right. So in Paragraph 12, it says: The hash
11 value generated may be used to index into the table
12 associated with a particular logical interface. Upon
13 indexing into the table associated with the logical
14 interface, an appropriate blade/port combination may be
15 identified to transmit the received packet of data.

16 Do you see that?

17 A. Yes.

18 Q. And you've cited that in Paragraph 47 of your
19 declaration, right? It says Basso, Paragraph 12.

20 A. Yes. And elsewhere I cite to that too, but
21 yes, certainly in paragraph 47.

22 Q. Right. I can only ask you questions about one
23 paragraph at a time, so I'll start from this one if
24 that's okay.

25 So in Figure 5 of Basso, it actually talks

1 about this hash value at step 504, right?

2 It says: Perform a hash function on packet
3 header to generate a hash value.

4 A. That's what Figure 5 says in the box labeled
5 504.

6 Q. Right. And then at 506, it says: Identify
7 appropriate physical blade and port to transmit received
8 packet using hash value, right?

9 A. I see that in box 506.

10 Q. Yeah. And that's consistent with what you've
11 put in your declaration at Paragraph 47, right?

12 A. Sure. I don't see any inconsistencies there.

13 Q. Yeah. Do you know where on this device the
14 packet -- let me withdraw that.

15 Do you know what component on the Basso device
16 performs the hash function?

17 A. I mean, I don't have it memorized, but I don't
18 recall that it -- that it -- that it -- that Basso was
19 discussed exactly where.

20 Q. Let me invite your attention to Figure 5, box
21 502. Do you see where it says "receive a packet of
22 data"?

23 A. Yes.

24 Q. Fair to say that this receipt described in
25 step 502 happens before the generation of a hash value,

1 which is at step 504?

2 A. Well, yes. I mean, you have to receive a
3 packet before you have a header or a packet to generate
4 a hash value for this value. I think that's consistent
5 with --

6 Q. Fair to say --

7 A. -- you know, the --

8 Q. Sorry. You wanted to -- I didn't mean to
9 speak over you.

10 A. I just added "consistent with what it's
11 saying" at -- at the end there.

12 Q. Fair to say that in Figure 4 of Basso, which
13 is shown in page 29 of your declaration, the network
14 processor is downstream from the switch fabric toward
15 the router?

16 A. For packets flowing from the top to the
17 bottom, sure. That example in Figure 4, that's what's
18 shown.

19 Q. Okay. And there's actually three network
20 processors, right?

21 A. Yeah. In -- in the example in Figure 4 there
22 are three network processors, one associated with each
23 blade.

24 Q. And the network processor is part of each
25 blade. Correct?

1 A. Yeah, I think that's what I just said.

2 Q. Okay. Now --

3 A. That example. Sorry.

4 Q. That's fine.

5 Now I'd like to invite your attention to
6 Paragraph 40 of Basso.

7 Paragraph 40 refers to step 502 shown in
8 Figure 5. Correct?

9 A. Sure.

10 Q. Then it says: In step 502, network processor
11 403, for example, network processor 403A may receive a
12 packet of data from switch fabric 401. Correct?

13 A. Sure. I mean, there's packets being received
14 at all different components and headers being examined
15 at different parts of the system too. This is now being
16 explicit about a network processor receiving a packet.

17 Q. So by the time that the header value is
18 generated at step 502 -- sorry, 504, the network
19 processor has already received the packet for which that
20 hash value is being generated. Correct?

21 A. In -- in this particular example in -- in the
22 figure -- I don't remember which figure it was now.
23 Whatever we're talking about, that -- that's the case.
24 But again, this -- Basso has the same catch-all language
25 about how -- about how the system, computer program,

1 product and method described in connection with several
2 embodiments. It is not intended to be limited to the
3 specific form set forth herein but, on the contrary, it
4 is intended to cover such alternatives, modifications,
5 and equivalents as can be reasonably included within the
6 spirit and scope of the invention.

7 Q. Right. But you understand that a catch-all --
8 the catch-all language in a prior art reference does not
9 constitute a disclosure of a claimed element, right?

10 A. I don't think I'm mapping the -- the catch-all
11 to the claimed element, any claimed element here.

12 Q. So you're -- it's your opinion that Basso
13 doesn't relate to any claimed element?

14 A. No.

15 ATTORNEY CLEMENTS: Objection. Scope.

16 A. What I said was I'm not mapping the catch-all
17 of -- in Basso to any claim element, but I am mapping
18 parts of Basso in the combination of Bruckman and Basso
19 to at least claim element 1.6 and then other related
20 elements that -- that -- that are parallel to that.

21 BY ATTORNEY STAMATOPOULOS:

22 Q. Okay. In Paragraph 46 you have highlighted
23 the phrase "each blade may comprise one or more network
24 processors coupled to one or more ports." What do you
25 mean by -- let me withdraw that.

1 What was your intention in highlighting the
2 phrase "each blade may comprise," which you put in bold
3 and underlined?

4 A. I mean, that's just -- that's -- I'm just
5 highlighting that -- that there are multiple ports
6 associated with each blade. For example, each blade
7 has, in the particular example in Figure 4, three ports,
8 and that's to highlight that there are multiple ports
9 that -- that interconnect to a router.

10 Q. These blades each have a single link to the
11 switch fabric. Correct? I'll refer you to the figure
12 shown in -- on page 29 of your declaration.

13 A. I mean, I'm not sure if Basso itself uses the
14 word "link" to describe the connection between the port
15 and the router, but I think that's an example of
16 something it -- it could be.

17 Q. Could be what?

18 A. A link.

19 Q. What is a computation?

20 ATTORNEY CLEMENTS: Objection. Form.

21 ATTORNEY STAMATOPOULOS: Let me withdraw that
22 question ask you a different one.

23 BY ATTORNEY STAMATOPOULOS:

24 Q. What is a computation in the context of the
25 '740 patent?

1 A. Well, I think if you're referring -- I mean, I
2 have a discussion of this in the -- the section under
3 claim construction we were looking at earlier.

4 So I think a POSITA would have understood that
5 the -- the -- the claim "single computation" is just one
6 way a POSITA could have understood it, would have
7 understood it, refers to a single computational result,
8 i.e., a single value and does not refer to performing
9 the selection process in a single step. And
10 alternatively, a POSITA would have understood the
11 claimed "single computation" to refer to only a specific
12 step within the multistep selecting process. For
13 example, the modulo function calculation described a
14 step described in step 86.

15 Q. Okay. For a single computation to be
16 performed, one would need a processor. Correct?

17 A. I mean, typically, computation -- you know,
18 processors are examples of things that can perform
19 computations.

20 Q. And in order to perform a selection by way of
21 a single computation, could I use any number of
22 processors together?

23 ATTORNEY CLEMENTS: Objection. Form.

24 BY ATTORNEY STAMATOPOULOS:

25 Q. Do you understand my question?

1 A. I think I do. I mean, I don't think that was
2 given as an example that I pointed to here.

3 Q. Is that the end of your answer?

4 A. Yes.

5 Q. Let's say a selection were performed by
6 multiple different processors. Would that constitute a
7 single computation, in your opinion?

8 ATTORNEY CLEMENTS: Objection. Form.

9 A. Well, I mean, if -- I think there are
10 instances where any one of them might be the single
11 computation that -- that is claimed. And they could be,
12 you know, performed again, I suppose, by other -- other
13 elements. But -- but -- but if -- if one of them meets,
14 you know, what I say here, then sure, that -- that would
15 be -- that could -- one of them or all of them could be
16 if they all meet what I discuss here.

17 BY ATTORNEY STAMATOPOULOS:

18 Q. Let's say the two separate processors
19 select -- let me withdraw that.

20 Let's say the two separate processors each
21 select a link from two groups of links.

22 Is it possible to say that the selection of
23 the two links occurred in a single computation?

24 A. You know, for example, if it -- if it met the
25 fact that -- that -- that it produced a single

1 computational result as -- as one way a POSITA would
2 have understood it.

3 You know, as -- as -- you know, if I do a
4 modulo function, for example, or -- or if I make -- do a
5 hash function, you know, that -- that one level is a --
6 a single computation.

7 But there are other levels where things may be
8 decomposed into a series of results. But what you're
9 asking for in that example would be, you know, that --
10 that could be a single computation, referring to just
11 the modulo function as I -- I've disclosed.

12 But it could also be -- it also would need the
13 fact that there's -- there's one result. You get the
14 answer. It's a single computational result. And so
15 that -- that kind of example meets the both ways.
16 But -- but there are other -- if you decompose, you
17 know, say, a multiply command and -- and -- into a -- it
18 typically results in a series of computations at a lower
19 level.

20 But if the result is the single result
21 requested, for example, what's the -- what's the answer
22 of multiplying, I think that's understood as a single
23 computation, for example, under the first way that I'm
24 talking about here.

25 Q. Right. Let me ask you a different question.

1 So the -- looking at Paragraph 46, you have
2 opined that each blade may comprise one or more network
3 processors, right?

4 I mean, you've quoted Basso, basically, saying
5 that.

6 A. Yeah. I mean, I'm not -- if it says that, it
7 says that. I -- I don't know where you're looking.

8 Q. I'm looking at Paragraph 46 of your
9 declaration. You've quoted from Basso, saying: A
10 switch fabric coupled to a plurality -- plurality of
11 blades where each blade may comprise one or more network
12 processors.

13 Do you see that?

14 A. Yes.

15 Q. Okay. Fair to say that the network processor
16 is part of the blade, given the disclosure in Basso?

17 A. I -- I think in this particular description,
18 that -- that would be the case. But I think generally,
19 the -- it wouldn't necessarily -- you know, given the --
20 the -- the way patents are laid out, you could put it
21 wherever in whatever -- you know, it's understood that
22 it could be elsewhere.

23 Q. Right.

24 A. In this -- in this example, it's -- it is in
25 the blade.

1 Q. In this example, in this example, is it fair
2 to say that the network processor cannot select the
3 blade to which data will travel, given that it is
4 already part of the blade and it needs to have received
5 a packet before making that selection?

6 ATTORNEY CLEMENTS: Objection. Scope.

7 A. I mean, Basso is -- the combination is --
8 is -- is really the analysis that I'm relying on. Not
9 with respect to the details of where this computation is
10 being performed, but Basso does say that the device, the
11 network device selects -- an appropriate blade/port
12 combination may be identified to transmit the received
13 packet of data. That's what Basso is teaching, and
14 that's a blade/port combination not just -- not just
15 port once you're at a blade. So Basso is -- is teaching
16 that -- that -- and that's what a person of ordinary
17 skill would understand. And it's the combination of --
18 of Basso and Bruckman that I'm saying renders at least
19 that -- that 1.6 and other related elements obvious.

20 Q. I understand that. I'm asking something
21 slightly different.

22 In the specific example shown in Paragraph 46
23 of your declaration and the figure above, given that the
24 network processor is part of the blade, is it possible
25 for the processor to select the blade?

1 A. Well, but -- but what I pointed to are other
2 sections of Basso talking about the -- the device
3 selecting a blade/port combination. So once you're on
4 the blade, you could -- you could -- you're on the
5 blade. But Basso is teaching that the device selects a
6 combination of a -- a blade and a port. And it's not
7 just Paragraph 12, but that's a few, I think, as we saw
8 earlier.

9 Q. I'm asking if you didn't have all these other
10 disclosures in Basso and you just had Paragraph 46 to go
11 by, and Figure 4 excerpted in your declaration, given
12 what you know and your expertise, do you think it's
13 possible for a network processor that resides on a blade
14 that has already received the packet on that blade to
15 then select the blade to which that packet will be
16 directed, given that the packet has already arrived on
17 that blade?

18 ATTORNEY CLEMENTS: Objection. Form.

19 BY ATTORNEY STAMATOPOULOS:

20 Q. Do you understand my question?

21 A. Sure. So, I mean, the switch has some --
22 needs to have some -- some ability to do some of the
23 things, so it actually may pick one.

24 There are situations where routing cables
25 become inconsistent in a device and one -- one blade

1 may, you know, have received something based on a
2 previous routing table that is actually no longer valid
3 at that particular point. So it could -- you know,
4 there may be situations where that blade may have to
5 send it to another blade or back up to the switch, for
6 example, because there are -- there are, you know, there
7 are timing differences as to when various tables are --
8 are updated.

9 Q. And, in fact, that scenario is discussed in
10 Basso in Paragraph 35, right? Where it says at the
11 bottom: Network processor 403, for example, network
12 processor 403A may further be configured to transmit the
13 processed packets to router 104B through any ports 404,
14 for example, ports 404A through C in its blade 402, for
15 example, blade 402A instead of just one physical port
16 404 and its blade 402, for example, blade 402A.

17 Do you see that?

18 A. Yeah, I think that was at the bottom of page
19 3, top of page 4. I do see that. That's exactly one of
20 the situations that I think I was describing.

21 Q. So the network processor selects a port in
22 every instance. Correct?

23 A. But it may also need to -- I mean, it's saying
24 here that it may route through another blade.

25 Q. Right. But in every instance it is the

1 network processor on the blade which selects the port.

2 Correct?

3 A. Well, I'm -- I mean, this is -- this is just
4 giving a -- one example where the one example is ports
5 404A through C in its -- its blade 402. But it does say
6 that it can be configured to transmit the packets
7 through any of the ports 404, which -- which in the
8 figure go up to 404I, so I think I'm not -- I'm not --
9 well --

10 Q. You're not following where I'm trying to go
11 with this?

12 A. Could you repeat the question, please?

13 Q. Yeah.

14 So in every scenario, whether it's -- whether
15 a packet is being transmitted through a port on the same
16 blade as the processor or through some other port that
17 is not on the same blade as the processor, it is the
18 processor which determines the ports through which
19 packets are transmitted. Correct?

20 ATTORNEY CLEMENTS: Objection. Scope.

21 A. I don't know if I'd say -- say every, but
22 certainly in this example -- well, actually, there's
23 a -- a better quote from the middle of the paragraph
24 that is network processor 403, e.g., network processor
25 403 configured to transmit the processed packets to --

1 oh, sorry.

2 Q. Yeah, I see what you're pointing me to.

3 A. There's one that says it can be used to -- it
4 can go through any -- any port, not just the -- the one
5 in the blades. Oh, yeah, here. It's a little higher
6 than where I started. If ports 404A through 404A were
7 logically grouped in logical interface 405, the
8 processor 403, e.g., network processor 403A, may be
9 configured to transmit processed packets to --
10 determined to be transmitted to router 104B through any
11 of the ports 404A through I and blades 402A through C
12 respectively, and it goes on.

13 It makes pretty clear that when the network
14 processor in this example gets a packet, it doesn't --
15 it isn't -- it isn't bound to transmitting the packet
16 over only the ports that are -- it's connected to
17 directly, but that it can go through another blade and
18 another port and it's consistent with the -- selecting
19 the blade and port together, as we have been discussing.

20 Q. Does all that process going from one processor
21 to the next and then from one blade to the other and
22 through the switch fabric, does all that happen in a
23 single computation, in your opinion?

24 A. Well, I mean --

25 ATTORNEY CLEMENTS: Objection.

1 A. It could be -- well, as I said earlier, it --
2 you know, what -- what if what's happening is that
3 network processor 1 makes -- makes the -- selects a
4 particular blade and port -- it doesn't have to be its
5 own -- and the packet is forwarded to another blade?
6 That's still a single computation, and if the -- the
7 network processor that subsequently receives it on a --
8 on a different blade makes the same computation, it's
9 also still the single computation, and so I -- it's --
10 it's consistent with what I've been saying and what's
11 described in Basso.

12 BY ATTORNEY STAMATOPOULOS:

13 Q. Understood.

14 In the example you discuss in Paragraph 46, it
15 is the switch fabric which directs incoming packets of
16 data to particular blades. Correct? That's in the last
17 sentence of Paragraph 46.

18 A. Sure. I mean, that's what it -- what it says.
19 That's what Basso says, and that would be the case as --
20 as well.

21 Q. Now -- sorry. Didn't mean to interrupt you.

22 A. Yeah, I mean, it's -- it's configured to send
23 an incoming packet to -- to one of the blades. That's
24 what it's saying.

25 Q. So in this example it's the switch fabric that

1 determines the blade. Correct?

2 A. So the switch fabric sends it to the blade,
3 doesn't nullify the -- the fact that the network
4 processor and the system overall determines a port and
5 blade. For example, in the network processor we're
6 using the hash function, and it -- it would specify to
7 go back to the switch fabric to another blade.
8 That's -- that's consistent with -- with everything that
9 I've been saying and the fact that in a network, you
10 know, when you have multiple devices such as the device
11 in '740 that are -- are part of various parts of the
12 network, there's all these computations. Like, in the
13 network there's -- you know, as you hop along through
14 the network there still may be portions where there's a
15 local computation for -- for -- that may be claimed
16 it -- the fact that a single packet may -- I mean, the
17 claim is what it claims, and I've laid out in my
18 analysis of what it's claiming.

19 I think all these other selecting in a single
20 computation, you know, it -- it -- I'd lay out how it
21 does that. It's the result of, for example, the -- the
22 modulo operation in some cases, as I -- as I discussed
23 in my -- in my analysis. I'll refer you to my analysis
24 in case I mischaracterize it.

25 Q. That's okay.

1 You don't state anywhere in your analysis that
2 the switch fabric performs a hashing function. Correct?

3 A. I -- I don't have it memorized, but I don't --
4 I don't recall anything like that in -- in particular.

5 Q. And sitting here today, you don't have any
6 reason to opine that the switch fabric performs a
7 hashing function, right?

8 A. I mean -- I mean, switch fabrics have to
9 figure out what -- there are lots of functions that can
10 be used to figure out how to get to a -- which output
11 port to use. And to the extent that they're shared and
12 again to -- going to the other -- same place that can be
13 configured in a router, one of the methods to select
14 could be, you know, could be a -- a -- using a hash
15 function, it could just be actually one's the primary
16 and the other one's just a backup. So I'm always going
17 to -- to send in -- there's lots of ways that switches
18 can be configured to select which output ports to use.

19 Q. If a switch fabric were to perform a hash
20 function -- let me withdraw that.

21 If the switch fabric in Basso used a hash
22 function or any other means to select a blade, that
23 would be a computation. Correct?

24 ATTORNEY PANETTA: Objection. Scope.

25 A. Well, let me be a little more precise in these

1 answers. The fabric, switch fabric itself typically
2 isn't the -- the one that -- that does anything. It's
3 typically the part of the -- the switch that just
4 carries the data to the appropriate port that's already
5 been -- already been decided upon.

6 And there are other control mechanisms in the
7 switch that set up the switch appropriately or address
8 particular communications appropriately. So I -- I
9 didn't mean to imply that to the switch fabric, but
10 there are -- there are parts of the switch that may
11 decide this. But that doesn't -- you know, the fact
12 that -- you know, if that even -- if you're saying that
13 happens, you know, if the network processors in Basso
14 are deciding the -- the appropriate blade and port, that
15 is -- that is the selection of a -- of a link and, you
16 know, for the two-level selection that's done in a -- in
17 a single computation, as I -- again, I don't want to
18 paraphrase. I'll just refer you to my report.

19 Q. Now, each of the blades in Basso -- let me
20 withdraw that.

21 Each of the ports in Basso is associated to a
22 single blade. Correct?

23 A. Well, I mean, in the example in Figure 4, I --
24 I think that's -- that's consistent what you're asking
25 is there are blades and there are ports that are -- that

1 are associated with -- with a particular blade.

2 Q. Let me repeat my question.

3 In Figure 4 -- I'll rephrase.

4 In Figure 4 in this example each of the ports
5 shown is associated only with a single blade.

6 True?

7 ATTORNEY CLEMENTS: Objection. Form.

8 A. So in the figure in -- in Figure 4, each of
9 the -- the ports only resides within the boundaries of
10 one particular blade.

11 BY ATTORNEY STAMATOPOULOS:

12 Q. And Basso does not disclose any embodiments
13 expressly in which a port may correspond to more than
14 one blade. Correct?

15 A. Looking at Paragraph 45, it -- it does talk
16 about that can group ports logically that are -- that
17 are coupled to a particular network device and that the
18 processor, network processor 403 may be configured to --
19 to transmit the packets to that particular network
20 device by any -- any blade/port combination grouped in
21 that logical interface. And that's -- and that's
22 describing a situation where a particular network
23 processor in this example of Figure 4 within the -- the
24 boundaries of one blade having cause to forward a packet
25 back to the switch fabric for transmission to -- to

1 another blade, to another port.

2 So in that sense, in that case, that -- that
3 blade that the -- that the logical interfaces don't have
4 to line up with the physical interfaces for a blade,
5 that it's describing a situation where logical
6 interfaces are just that, logical, logical interfaces
7 that can be mapped to the -- to the network processors
8 of a blade in other ways. So in that sense, there
9 could -- it is describing a -- a different kind of
10 association for a logical grouping.

11 Q. Let's take the physical grouping first. In
12 terms of the physical grouping, each physical port is
13 associated only to one physical blade. Correct?

14 A. Yeah, I think that's -- in the physical sense,
15 that's what -- that's what is described in the -- in the
16 example of Figure 4.

17 Q. And in the logical sense where you could have
18 a packet or a frame travel from one blade to a port that
19 resides on another blade, that would have to happen via
20 the switch fabric. Correct?

21 A. It would be, but it's -- it's saying that it's
22 the network processor that's configured to transmit
23 packets, so that particular network -- the particular
24 network devices by any -- any blade/port.

25 Q. Right. But for that to happen, in the

1 immediately preceding sentence it says network processor
2 403, for example, network processor 403A, may be
3 configured to transmit the processed packets to router
4 104B through any ports 404, for example, ports 404D
5 through I not in its blade 402, for example, blade 402A
6 by forwarding the processed packets to switch fabric
7 401.

8 Do you see that?

9 A. Yes. That's -- the switch fabric would be
10 used to get between different blades. That's what it's
11 saying.

12 ATTORNEY STAMATOPOULOS: Right. Let's take a
13 very short break. I don't think I'm going to have much
14 more. I want to regroup.

15 (Recess taken.)

16 BY ATTORNEY STAMATOPOULOS:

17 Q. Welcome back, Dr. Houh. I just have a few
18 more questions, I think. Let's go to Paragraph 89 of
19 your declaration.

20 A. Okay.

21 Q. You have a brief excerpt here from Bruckman
22 about service level agreements.

23 Do you see that?

24 A. Yes.

25 Q. What is the import, if any, of service level

1 agreements to the operation of the apparatus claimed in
2 the '740 patent?

3 A. It's really to support that -- that Bruckman
4 uses the term "customer" and "user" interchangeably, and
5 so that -- that Bruckman's customer nodes 24, 26, 28 are
6 the user nodes and its -- its service level agreements
7 that you'd have with -- with providers and customers or
8 the users. I think it's really just to support that
9 notion that I'm discussing here.

10 Q. You say the connections on link 30 -- this is
11 from Bruckman -- including any link aggregation groups
12 then compete for the remaining available bandwidth.

13 Do you see that?

14 A. Yes.

15 Q. What do you mean by "they compete for the
16 remaining available bandwidth"?

17 A. Well, the germane part of this citation is
18 really that it's -- it's with respect for -- to -- to
19 that contracted in the -- the user's service level
20 agreements, which we typically say that, you know, a --
21 a customer has -- is guaranteed some level of bandwidth.
22 So it's -- it's -- but it's just -- again, this is all
23 to support that -- that customers and users are kind of
24 used interchangeably to support the notion that Bruckman
25 is disclosing user nodes.

1 Q. And in a connection -- let me take you to the
2 '740 patent. Actually, let me take you to Bruckman
3 again.

4 In a connection where a particular user is
5 connected to the device of Bruckman only through a
6 single set of ports corresponding to one of the
7 concentrators, the factor that would limit the bandwidth
8 available to that user would be the bandwidth of the
9 trace associated with that concentrator. Correct?

10 ATTORNEY CLEMENTS: Objection. Scope.

11 A. I won't necessarily say it's the -- the only
12 thing, but certainly the bandwidth of the traces 52 is a
13 potential factor.

14 Q. Right. And in Paragraph 86 -- sorry, in
15 Paragraph 56 of Bruckman, it says to prevent overloading
16 of traces 52, concentrators 50 may limit the rate of
17 incoming data admitted on each link 30 so that it
18 remains between the predetermined minimum.

19 Do you see that? It starts roughly where that
20 Table 1 starts.

21 A. Yeah, I think I -- I just found it. But yeah,
22 I -- I see that.

23 Q. And one of the limiting factors is -- for a
24 concentrator is the trace bandwidth to which it is
25 connected. Correct?

1 A. Yeah, I mean, I think -- I think I said
2 that -- that it's one of the factors but may not be
3 the -- the only factor.

4 Q. Understood.

5 Why, in your view, does the embodiment -- let
6 me withdraw that question. Let me direct you to
7 patent -- the '740 patent, Figure 1.

8 A. Okay.

9 Q. You can see that in Figure 1, MUX 44 is
10 located upstream from line cards 1 through N. Correct?

11 A. Sure. I -- I wouldn't disagree.

12 Q. Why, in your view, does -- withdrawn.

13 What, if any, are the advantages of placing
14 MUX 44 upstream from line card 1?

15 ATTORNEY CLEMENTS: Objection. Scope.

16 THE WITNESS: Well, I -- I mean, as opposed to
17 where?

18 BY ATTORNEY STAMATOPOULOS:

19 Q. As opposed to before the -- before the
20 backplane traces that connect the line cards to the MUX.

21 A. I mean, I don't understand your -- the
22 comparison, actually. I mean, I -- what -- you want to
23 put it like directly attached to the -- all line cards,
24 for example?

25 Q. Why -- not -- why -- sorry, go ahead.

1 A. And then have traces coming up to the right of
2 the -- of the MUX like a bunch of -- of traces, or one
3 trace?

4 Q. Yes.

5 A. So the -- your comparison is instead of having
6 multiple, somehow the MUXs are embedded with the whole
7 group of -- of line cards and there's just one trace
8 going to -- going to network processor between the
9 output of the MUX.

10 Q. Correct.

11 A. Well, I guess I don't know why that is -- I
12 mean, the -- the -- the traces simply carry the data. I
13 suppose -- are carrying the data between the outputs of
14 the line card or the -- the right side of the line card
15 and -- and the left side of the MUX.

16 I don't know what's so different just by
17 shrinking one set of lines and lengthening the other set
18 of lines in your -- in your modification.

19 Q. So in other words, you don't think there's any
20 advantage to immediately multiplexing signals coming out
21 of the ports 24 into line card 1 and not having them
22 travel over the traces. Correct?

23 ATTORNEY PANETTA: Objection to form.

24 A. Well, I mean, this -- this doesn't say how
25 long this -- this -- this trace -- the line is between

1 the MUX and the -- and the network processor. I mean,
2 maybe there are advantages to having shorter lines at
3 one place, like a shorter line is typically less loss in
4 one, you know, over the line. But to the extent those
5 are on a chip, I'm not sure that the -- you know, that
6 kind of thing impacts, you know, if the line is -- if
7 the trace can carry high bandwidth, then it can carry
8 high bandwidth. If it's laid out as a transmission line
9 on the board, which they typically are, then they have
10 very good -- oftentimes have very good transmission
11 properties. So I'm not sure what exactly the difference
12 your -- your suggestion would be other than the length
13 of the lines on the different sides would be different.

14 And -- and, you know, obviously, I -- well, I
15 think the -- the link between the MUX and network
16 processor in Figure 2 -- talking about Figure 2 or 1?

17 Q. Figure 1.

18 A. Figure 1. Is -- is higher speed. Because it
19 is multiplexing it can multiplex data from -- from
20 numerous sources, or it can be higher speed. It doesn't
21 have to be. So, I mean, I -- I'd have to get more
22 details about this -- this change. That's what I can
23 think of at this moment. But if I -- if I found out
24 more details about -- about things, I -- I think I could
25 give a -- a better answer.

1 Q. Let me invite your attention to Paragraph 184.
2 A. Of what?
3 Q. Of your declaration. Sorry.
4 A. Okay.
5 Q. I just want to confirm something.
6 Are you relying on Basso at all for your
7 opinions in connection with this limitation?
8 A. Yeah, I'm pointing back to 1.6, which does
9 have a discussion with respect to Basso. But in -- I
10 think -- is this the section about sections 1 and 2? So
11 yes, there is some reliance with -- with respect to what
12 I say in 1.6 with the second ground that's a
13 combination, but there's also a ground that is just
14 Bruckman, obviousness for Bruckman alone.
15 Q. I want to ask you to point me to the control
16 module that is claimed in limitation 17.5. Let me
17 withdraw that question.
18 So limitation 17.5 recites a control module.
19 Correct?
20 A. Yes.
21 Q. Where in Bruckman -- withdrawn.
22 Do you rely on Bruckman or on Basso for the --
23 for this control module?
24 A. Yeah, I'm -- I'm relying on Bruckman here. If
25 you look at 184, which is Bruckman, 22 includes a

1 controller 42, which is what -- one of the -- which what
2 I'm saying is the control module.

3 Q. So you're not relying on Basso for this
4 control module. Correct?

5 A. Well, I'm -- no, I'm pointing to what's in
6 Bruckman for -- for it. And then with respect to the --
7 to the rest of the analysis, what the control module
8 does with respect to the rest of the claim elements that
9 points back to 1.6, which has in certain -- you know,
10 the second ground discussion of Basso and the
11 combination.

12 Q. Thank you.

13 With respect to Holdsworth, you are arguing
14 that Holdsworth is relevant to Claims 11 and 26.
15 Correct?

16 A. Yes. And I guess there's a lack of update of
17 the title, table of contents, but the -- grounds 3 and 4
18 relying on the -- on the combination of Bruckman alone
19 or with Basso, and that would account for 3 versus 4 in
20 view of Holdsworth. And so it is just for Claims 11 and
21 26, but two grounds, one which is Bruckman in view of
22 Holdsworth with another, which is Bruckman with Basso in
23 view of Holdsworth.

24 ATTORNEY STAMATOPOULOS: I think that's all.
25 Thank you very much for your time. I don't know if

1 there's any redirect.

2 ATTORNEY CLEMENTS: Why don't you give me a
3 five-minute break to review my notes and go from there?

4 ATTORNEY STAMATOPOULOS: All right, thank you.
5 (Recess taken.)

6 ATTORNEY CLEMENTS: I have no further
7 questions for Dr. Houh.

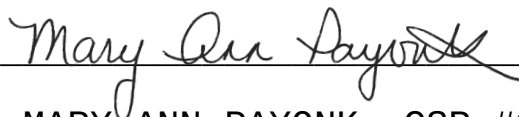
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9 (Deposition adjourned at 4:29 p.m.)
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REPORTER'S CERTIFICATE

I, MARY ANN PAYONK, shorthand reporter and Notary Public, CA CSR No. 13431, do hereby certify that the witness whose deposition is hereinbefore set forth was sworn by agreement of all parties, that the proceedings were reported stenographically by me, and that this transcript is a true, correct, and full record of the testimony given.

I further certify that I am not related to any of the parties to this action by blood or by marriage, and that I am in no way interested in the outcome of this matter.

IN WITNESS WHEREOF, I have hereunto set my hand this 17th day of November, 2023.

A handwritten signature in cursive script, reading "Mary Ann Payonk", is written over a horizontal line.

MARY ANN PAYONK, CSR #13431

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ERRATA SHEET FOR TRANSCRIPT OF: Henry H. Houh, Ph.D.

CASE CAPTION: Cisco vs. Orckit

DEPOSITION DATE: November 14, 2023

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Signature of Deponent

Date

1 I,

2 HENRY H. HOUH, Ph.D.

3 state that I have read the foregoing deposition and
4 declare under penalty of perjury:

5 That the foregoing is my deposition under
6 oath;

7 That I have read same and have made the
8 necessary corrections, additions or changes to my
9 answers that I deem necessary;

10 That my answers as indicated are true and
11 correct.

12
13 Executed at _____
14 this _____ day of _____, 2023.

15
16 _____
17 HENRY H. HOUH, Ph.D.
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