

Volume I

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

UNIFIED PATENTS, LLC,

Petitioner,

vs.

Case No. IPR2023-00193

U.S. Patent No. 9,264,991

OZMO LICENSING LLC,

Patent Owner.

REMOTE DEPOSITION OF ZYGMUNT J. HAAS

Friday, September 8, 2023, 10:07 a.m.

Via Zoom

----Reporter: Loretta Hennessey, RDR, CRR----

K. L. GOOD & ASSOCIATES

Post Office Box 367

Swampscott, Massachusetts 01907

Tel. 781-367-0815

Kathleen.Good@verizon.net

1 APPEARANCES:

2 Hamilton, Brook, Smith & Reynolds, P.C.
3 Lawrence Cogswell III, Ph.D., Attorney
4 Daniel A. Fleisher, Attorney
5 155 Seaport Boulevard
6 Boston, Massachusetts 02210
7 617-607-5907
8 Lawrence.Cogswell@hbsr.com
9 Daniel.Feisher@hbsr.com
10 Attorneys for Patent Owner Ozmo
11 Licensing LLC

12 Duane Morris
13 John M. Baird, Attorney
14 Paul H. Belnap, Attorney
15 901 New York Avenue N.W., Suite 700 East
16 Washington, DC 20001-4795
17 202-776-7819
18 JMBaird@duanemorris.com
19 PHBelnap@duanemorris.com
20
21
22
23
24

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P R O C E E D I N G S

ZYGMUNT J. HAAS, Sworn

having been satisfactorily identified by
production of his Texas driver's license and
duly sworn, was examined and testified as
follows:

EXAMINATION BY MR. COGSWELL:

Q. Good morning, Dr. Haas.

A. Good morning, sir.

Q. Before I start, I want to make sure I'm
pronouncing your last name correctly. Am I?

A. Haas, yes, sir.

MR. BAIRD: Larry, normally we would
announce our appearances. We don't have a
videographer. Should we just do that for the
record?

MR. COGSWELL: Yes, let's do it. I'm
Lawrence Cogswell from the firm of Hamilton
Brook Smith & Reynolds representing the Patent
Owner. With me today is Daniel Fleisher, also
representing the Patent Owner and from our firm.

MR. BELNAP: Good morning, everyone. My
name is Paul Belnap from the firm of Duane
Morris. With me is my colleagues John Baird,

1 counsel for Petitioner Unified Patents.

2 BY MR. COGSWELL:

3 Q. Good morning, Dr. Haas.

4 A. Good morning, sir.

5 Q. You understand that you are appearing today in
6 connection with IPR2023-00193, correct?

7 A. 2022-00193, sir.

8 Q. Okay. Thank you. And I'm going to get into a
9 few of the ground rules for the deposition.

10 Let me ask: Have you been deposed
11 before?

12 A. Yes, I have, sir.

13 Q. How many times, approximately, have you been
14 deposed before?

15 A. So please do not hold me to the exact number,
16 because I don't remember, but I would say
17 somewhere around 25 or over 25 times.

18 Q. And approximately how many of those times were
19 you appearing as an expert witness in an IPR
20 proceeding?

21 A. Most of those depositions were in connection to
22 IPRs, so...

23 Q. Thank you. I'm going to go over just a few
24 ground rules.

1 You understand you're testifying today
2 under oath, correct?

3 A. Yes, sir, I do.

4 Q. And I expect you'll give your full, complete,
5 and truthful testimony to the best of your
6 ability. Is that fair?

7 A. Absolutely, sir.

8 Q. I'll try to make my questions clear to you. If
9 they're not clear or if there's anything that
10 you don't understand, please tell me and I'll
11 rephrase or clarify. Is that fair?

12 A. Yes, sir.

13 Q. Given that we're appearing virtually today, it's
14 especially important that we make everything
15 clear for the court reporter. I will try to
16 speak at a reasonable speed and articulately so
17 everything can be transcribed.

18 I would ask that we try hard not to
19 speak over each other so it makes the court
20 reporter's job easier. Is that fair?

21 A. Yes, sir, it is.

22 Q. If you need to take a break for any reason,
23 please let me know. We'll probably be taking a
24 break at least every hour. The only thing I

1 would ask is that if we're in the middle of a
2 particular question, that we just finish up with
3 your answer before we take a break. Is that
4 fair?

5 A. Yes, sir.

6 Q. Is there any reason that you would not be able
7 to give your full, complete, and truthful
8 testimony today?

9 A. No, there's no reason, sir.

10 Q. Okay. With that, let's turn to the '991 patent.
11 This has been marked as Exhibit 1001.

12 MR. COGSWELL: And just for everyone on
13 the line, including counsel, does everyone have
14 a copy of Exhibit 1001 in front of them?

15 MR. BELNAP: I do, yes.

16 MR. COGSWELL: Okay. Thank you.

17 Q. Dr. Haas, if you could, could you please access
18 a copy of Exhibit 1001, which is the US patent
19 No. 9,264,911.

20 A. Yes, sir.

21 To answer your previous question, I have
22 the documents in soft copies, meaning the files
23 that I can see on my screen.

24 Q. That is fine. Thank you.

1 A. I would also like to mention that my screen is
2 above the camera, so you'll be seeing me looking
3 up. It is not that I am not paying attention,
4 it's just that the screen is above the camera in
5 my arrangement here.

6 Q. Yes. Of course. I completely understand.

7 A. I'm at Exhibit 1001, sir.

8 Q. And you recognize Exhibit 1001 as being the '991
9 patent that's at issue in this proceeding,
10 right?

11 A. That's correct, sir.

12 Q. How would you describe generally what the '991
13 patent is directed to?

14 MR. BELNAP: Objection, form.

15 A. So if you will allow me, sir, I would be looking
16 at my declaration, which is Exhibit 1003 in this
17 case. And I am looking at paragraph 26.

18 Paragraph 26 says, "The '991 Patent is
19 directed to a wireless hub that integrates
20 wireless networks, such as a Wireless Local Area
21 Networks ("WLAN") and a Wireless Personal Area
22 Network ("WPAN")."

23 And there is a reference here to Exhibit
24 1001 (54), as well as abstract 1, lines 17-18,

1 sir.

2 Q. Is it fair to say that the '991 patent solves
3 certain problems with the coexistence of two
4 networks?

5 MR. BELNAP: Objection, form.

6 A. So the next paragraph discusses the failure that
7 the '991 patent -- there's a quote here.

8 "'Interoperability between wireless [sic] PAN
9 "'and WLAN networks' is hindered by 'severe
10 interference when devices conforming to wireless
11 [sic] PAN and wireless [sic] LAN standards are
12 in the same physical vicinity.'"

13 Q. Does the '991 patent in your view address any
14 power consumption issues specific to integrating
15 WPAN and WLAN?

16 MR. BELNAP: Objection, form.

17 A. So I can quote here, again from my declaration,
18 in paragraph 27. It says here in the middle of
19 this paragraph, "While 'one alternative for
20 avoiding this problem is to use network
21 interface circuitry based on the wireless [sic]
22 LAN protocol in wireless [sic] PAN, the power
23 dissipation of the resulting STA would be higher
24 than what is acceptable in typical WPAN

1 applications.'"

2 And it goes on to say, "'This power
3 dissipation' results from, *inter alia*, wireless
4 [sic] LAN's 'high transmit powers' that enable
5 stations to 'communicate with the access point,
6 AP, which may be, for example, 300 feet away,'"
7 and so on.

8 And it goes on to say, in paragraph 28,
9 "The '991 Patent purports to address these
10 issues with a 'wireless hub 12 adapted to
11 facilitate seamless communication between the
12 wireless [sic] LAN and the wireless [sic] PAN,'"
13 in quotation marks, and goes on to expand it
14 further.

15 Q. Okay. Thank you. Let's turn now to Exhibit
16 1004, please, which is Cromer, et al, US patent
17 No. 7,389,352.

18 Could you let me know when you have that
19 up on your screen, please.

20 A. I have it on the screen.

21 Q. Do you recognize this as the Cromer patent that
22 you cited in your declaration?

23 A. Yes, sir. This is the Cromer reference that I
24 used in my declaration, sir.

1 Q. Let's look at the cover page of Cromer.

2 A. I'm looking at the cover page of the Cromer
3 reference, sir.

4 Q. So do you see where the cover page shows item
5 54, the title of the Cromer patent?

6 A. Yes, sir.

7 Q. And it says that the title is "System and Method
8 for Concurrent WLAN and WPAN Wireless Modes from
9 a Single Device," right?

10 A. I see the title, sir.

11 Q. Is it fair to say that Cromer teaches a WLAN
12 mode?

13 MR. BELNAP: Objection, form.

14 Q. Do you understand the question, Dr. Haas?

15 A. No, I don't, sir.

16 Q. Okay.

17 A. I need you to explain what you mean by wireless
18 LAN mode. I'm not exactly sure what your
19 question is, sir.

20 Q. Okay. You're familiar with wireless LAN, right?

21 A. Of course, sir.

22 Q. And the title of the Cromer patent says, "System
23 and Method for Concurrent WLAN and WPAN Wireless
24 Mode from a Single Device," right?

1 A. Yes, sir.

2 Q. So the title uses the language "Wireless Mode,"
3 right?

4 A. Yes, sir.

5 Q. And one of those wireless modes in the title is
6 a WLAN wireless mode, right?

7 A. That's correct, sir.

8 Q. So is it fair to say that Cromer teaches a WLAN
9 wireless mode?

10 MR. BELNAP: Objection, form.

11 A. Wireless LAN network is being used as a network
12 in the Cromer reference, sir.

13 Q. And is the WPAN mode also being used in
14 connection with wireless networking in the
15 Cromer reference?

16 MR. BELNAP: Objection.

17 A. The wireless PAN, wireless personal area
18 network, is being used in the Cromer reference,
19 sir.

20 Q. And both WLAN and WPAN are wireless modes in
21 Cromer, correct?

22 MR. BELNAP: Objection, form.

23 A. Both wireless LAN and wireless PAN use wireless
24 communication as part of this network

1 architecture, sir.

2 Q. You would agree Cromer teaches a single device
3 communicating in WLAN mode, right?

4 A. The device in Cromer, which is referred to in
5 Cromer as client 100, uses wireless LAN as one
6 of the -- of its communication networks.

7 Q. Okay. One moment, Dr. Haas.

8 You referred to client 100. What is
9 client 100?

10 A. Client 100 in Cromer, in column 3 of the Cromer
11 reference, in line, I think it's either 20 or
12 19, it's sort of difficult to see here, I think
13 it's 19 or 20, "client 100 uses a Wi-Fi device
14 in 'infrastructure' mode at intervals when
15 client 100 is communicating in a" wireless local
16 area network" environment and client 100 uses
17 the same device in 'adhoc' mode at intervals
18 when client 100 is communicating in a" wireless
19 PAN environment.

20 I paraphrased -- I'm sorry, I used
21 wireless PAN and WPAN and WLAN, I pronounced it
22 as wireless PAN and wireless LAN, sir.

23 Q. Okay. Thank you.

24 So let's move on to column 1 of Cromer,

1 specifically the Technical Field section 1 at
2 the start of the column.

3 A. I'm here, sir.

4 Q. And could you please read the Technical Field of
5 the invention section to yourself, which starts
6 at column 1, line 6, and ends at column 1, line
7 14. And let me know when you've done that,
8 please.

9 A. Yes, sir.

10 I am finished reading the Technical
11 Field section of Cromer.

12 Q. Do you see the second section of that paragraph
13 where it says Cromer's invention relates to
14 "using a single Wi-Fi device to concurrently
15 communicate in a wireless LAN environment and a
16 wireless PAN environment"?

17 MR. BELNAP: Objection, form.

18 A. I see the statement, sir.

19 Q. Would you agree that that sentence accurately
20 describes the subject matter of Cromer?

21 MR. BELNAP: Objection, form.

22 A. The sentence reads clearly what is in the
23 Technical Field section of the Cromer.

24 Q. So let's continue with column 1 of Cromer.

1 Moving to the next-to-last paragraph of the
2 description of the Related Art section.

3 A. I'm sorry, the next-to-last paragraph in the
4 Related Art section, correct, sir?

5 Q. That's correct. Column 1, line 45 through 56.
6 Could you read that to yourself and let me know
7 when you're done, please.

8 A. I read it, sir.

9 Q. Do you see the last sentence of that paragraph
10 where it says, quote, "In order to support
11 simultaneous infrastructure and peer-to-peer
12 environments using Wi-Fi technology, two Wi-Fi
13 devices are required, one for each environment,
14 thereby increasing the computer system's
15 equipment cost"?

16 A. I see the sentence, sir.

17 Q. And staying on that sentence, would you agree
18 that the expression "Wi-Fi technology" refers to
19 Wi-Fi technology that existed before Cromer?

20 MR. BELNAP: Objection, form.

21 A. In this sentence, the Wi-Fi technology would be
22 understood as the Wi-Fi technology that existed
23 at the time of the Cromer patent, sir. At least
24 as of the time of the Cromer patent.

1 Q. And is it correct to say that the infrastructure
2 environment referred to could also be referred
3 to as a WLAN environment?

4 MR. BELNAP: Objection, form.

5 A. I think that your question is a little bit
6 ambiguous. If you may please either repeat the
7 question or explain it more accurately? What do
8 you exactly mean?

9 Q. Sure. That paragraph refers in part to an
10 infrastructure environment, correct?

11 A. The sentence refers to, in part, to
12 infrastructure environment.

13 Q. And the first sentence refers to "WPAN
14 environments," correct?

15 A. The first sentence in part refers to "WPAN
16 environments."

17 Q. So my question is, is the reference to an
18 infrastructure environment the reference to a
19 WLAN environment?

20 A. The reference to infrastructure environment
21 using Wi-Fi technology refers to the Wi-Fi
22 technology operating in infrastructure mode,
23 sir.

24 Q. When -- is it correct to say that the reference

1 to peer-to-peer environment in that paragraph
2 could also be referred to as a WPAN environment?

3 A. Wi-Fi technology can operate in peer to peer, to
4 support peer-to-peer environment, sir.

5 Q. And is a -- what kind of environment would a
6 WPAN network operate in?

7 MR. BELNAP: Objection, form.

8 A. If we look, for example, sir in column 1, Line
9 33 -- excuse me, column 1 -- it's off here
10 because the numbering is a little confusing
11 here. It says, "A wireless personal area
12 network [sic] is used to" wireless to
13 intersect -- I'm sorry -- "to wirelessly
14 interconnect devices centered on an individual
15 person through a point-to-point or peer-to-peer
16 connection," sir. And goes on to say that a
17 wireless personal area "network uses technology
18 that permits communication within a very short
19 range, such as ten meters."

20 Q. Okay. Do you see in that paragraph a reference
21 to "two Wi-Fi devices"?

22 A. I'm sorry, in which paragraph? The paragraph
23 that starts with "Wi-Fi technology could
24 replace"?

1 Q. Yes. And the line number would be column 1,
2 line 53, I believe, perhaps 54.

3 A. The lines says, "In order to support
4 simultaneous infrastructure and peer-to-peer
5 environments using Wi-Fi technology, two Wi-Fi
6 devices are required, one for each environment,
7 thereby increasing a computer system's equipment
8 cost."

9 Q. Do you have an understanding of whether Cromer's
10 reference to "two Wi-Fi devices" refers to
11 different pieces of Wi-Fi hardware?

12 MR. BAIRD: Objection, form.

13 A. It refers to two Wi-Fi devices, sir.

14 Q. And what is your understanding of Wi-Fi device?

15 A. It's a device that operates in a Wi-Fi -- based
16 on the Wi-Fi protocol, sir.

17 Q. And would this be a hardware device?

18 A. Wi-Fi device, sir, would be understood to
19 include hardware as well as software, sir,
20 typically.

21 Q. Do you have an understanding from Cromer whether
22 Cromer is using Wi-Fi device to include software
23 as well as hardware?

24 MR. BELNAP: Objection, form.

1 A. When we talk about devices, sir, we typically
2 include the hardware as well as the software
3 that support the device -- that supports the
4 device, a device. Software can be in different
5 forms, firmware, for example, firmware. This is
6 the typical understanding of the term "device."

7 But you would need to point me to a
8 particular sentence that you want me to explain
9 in order for me to understand how the term
10 "device" is used in the particular sentence.

11 In general, "device" refers to both
12 hardware and software supporting the device, but
13 clearly one can use the term "device" only
14 referring, for example, only to the hardware
15 device. So how it is used depends on the
16 context, sir.

17 Q. Okay. So let's do this in view of that. With
18 reference to Cromer and its figures, can you
19 give me some examples of Wi-Fi devices in
20 Cromer?

21 MR. BELNAP: Objection, form.

22 A. So as we discussed before in column 3, I believe
23 it's line 19, but it may be 20, "Client 100 uses
24 a Wi-Fi device in 'infrastructure' mode at

1 intervals when client 100 is communicating in a
2 wireless [sic] LAN environment."

3 And again I -- please excuse me if
4 during the deposition I am reading WLAN and
5 wireless LAN, because this is what it means in
6 this context, and I often just read "wireless
7 LAN" for the acronym "WLAN," sir.

8 Q. I understand. Thank you.

9 And what is client 100 in Cromer?

10 MR. BELNAP: Objection, form.

11 Q. Let me ask a more specific question.

12 Is client 100 a PC?

13 A. Client 100, sir, is shown, for example, in
14 figure 7, which is set to include a block
15 diagram of an information-handling system such
16 as a client device capable of implementing the
17 present invention.

18 Q. And do you have any understanding of whether or
19 not client 100 is a personal computer?

20 A. I'm sorry, is what?

21 Q. Do you have any understanding of whether or not
22 client 100 is a personal computer or a PC?

23 A. Whether it is a personal computer?

24 Q. Yes.

1 A. I -- from my recollection, sir, I do not recall
2 whether Cromer specifically states what kind of
3 technology, in what type of technology client
4 100 could be implemented.

5 Q. Can we turn to Exhibit 1003, which is a copy of
6 your declaration, please.

7 A. I am on Exhibit 1003, sir, which as you stated
8 is a copy of my declaration.

9 Q. If you could please turn to paragraph 81 and let
10 me know when you're there.

11 A. I'm on paragraph 81, sir.

12 Q. And in paragraph 81 you said, in part, "*Cromer's*
13 client 100 was a 'computer system' such as a
14 personal computer."

15 Do you see that?

16 A. I'm sorry, you are referring to paragraph 81 of
17 my declaration?

18 Q. Yes.

19 A. Paragraph 81 of my declaration says --

20 Q. I'm sorry. I'm sorry. It's paragraph 82. I'll
21 make the record clear, I apologize. I was a
22 paragraph off.

23 In paragraph 82 of your declaration you
24 state, in part, "*Cromer's* client 100 was a

1 'computer system' such as a personal computer."

2 Do you see that?

3 A. Yes, I see that, sir.

4 Q. Now, would you agree that Cromer's client 100
5 was a computer system such as a personal
6 computer?

7 A. One example of implementation of Cromer's client
8 100 would be indeed a personal computer. It
9 doesn't have to be a personal computer only, or
10 limited to personal computer, sir.

11 Q. Turning back to Cromer figure 7, if we may.

12 A. Yes, sir. I'm on figure 7 of Cromer, sir.

13 Q. Does figure 7 show any kind of Wi-Fi device?

14 MR. BELNAP: Objection, form.

15 A. Figure 7, sir, shows Wireless Interface 710
16 which includes Transceiver and additional
17 hardware as well as -- as well as additional
18 components that are included in the Wireless
19 Interface 710, sir.

20 Q. So the wireless interface includes, for example,
21 Transceiver 715, correct?

22 A. The Wireless Interface 710 in figure 7 of Cromer
23 includes the Transceiver 715, sir.

24 Q. And do you see where the Wireless Interface 710

1 also includes a box called "Mode" identified as
2 735?

3 A. I see a box 735 which is included as part of the
4 Controller 730 which is in turn included as part
5 of the Wireless Interface 710, sir.

6 Q. Do you have an understanding from reviewing
7 Cromer what the function of Mode 735 is?

8 MR. BELNAP: Objection, form.

9 Q. Do you understand the question, Dr. Haas?

10 A. If I may paraphrase your question, sir. You are
11 asking me what is the function of the box 735.
12 Is this correct, sir?

13 Q. Correct.

14 A. So if we go, sir, to column 7 of Cromer, line
15 21, it says, "Controller 730 includes mode bit
16 735, timer 740," and so on and so on.

17 And then in the next sentence it says,
18 "Client 100 checks mode bit 735 to determine
19 whether" to do -- "whether to be in single
20 network mode or dual network mode," sir.

21 Q. So you'll recall that the title of Cromer is a
22 "System and Method for Concurrent WLAN and WPAN
23 Wireless Modes from a Single Device," right?

24 A. The title of Cromer was "System and Method for

1 Concurrent WLAN and WPAN Wireless Modes from
2 Single Device," sir.

3 Q. And do you have an understanding from reading
4 Cromer of the meaning of "single device" as used
5 in the title of Cromer?

6 A. "Single device" means single device, sir.

7 Q. In figure 7, is Wireless Interface 710 an
8 example of the "single device" referred to in
9 the title of Cromer?

10 MR. BELNAP: Objection, form.

11 A. Figure 7 is an example of -- I'm sorry, let me
12 start again.

13 Figure 7 is a block diagram of
14 information-handling system such as a client
15 device, which is capable of implementing the
16 present invention of Cromer.

17 Q. And would element 710 be an example of what
18 Cromer refers to in his title as a "single
19 device"?

20 A. I do not believe so, sir, that it's accurate,
21 what you said.

22 Q. If we could turn to the Related Art section of
23 Cromer again, please, which is in column 1.
24 You'll see a reference on or about column 1,

1 line 54, to prior art systems using two Wi-Fi
2 devices.

3 Can you let me know when you see that,
4 please.

5 A. I see that, sir.

6 Q. Okay. Can you give me some examples of what you
7 understand Cromer to be referring to as systems
8 requiring two Wi-Fi devices?

9 MR. BELNAP: Objection, form.

10 A. An example of two Wi-Fi devices would be two
11 systems that implement -- each one of them
12 implements the Wi-Fi functionality.

13 Q. Can you explain what you mean by "implements the
14 Wi-Fi functionality" as you used that term in
15 your answer?

16 A. Sure, sir. When I say "implements the Wi-Fi
17 functionality," means it can execute, perform
18 the Wi-Fi protocol, sir, or a Wi-Fi protocol.

19 MR. COGSWELL: Okay. This is probably a
20 good time to take a break. We've been going
21 almost an hour. Why don't we take about ten
22 minutes, and reconvene at about 11:10 Eastern
23 time.

24 THE WITNESS: Yes, sir. Thank you, sir.

1 MR. COGSWELL: Thank you.

2 (Recess.)

3 BY MR. COGSWELL:

4 Q. So are we ready to continue?

5 A. I'm ready, sir.

6 Q. Welcome back, Dr. Haas.

7 A. Thank you, sir.

8 Q. If we could turn to Cromer, Figure 1, I'd like
9 to ask you some questions about the figure and
10 the operation of Cromer as you understand it.
11 Is that fair?

12 A. I'm at Figure 1, sir.

13 Q. Okay. I believe you said earlier, and correct
14 me if I'm wrong, that a client 100 could include
15 a personal computer, for example, right?

16 A. An example of client 1 -- client 100 would be a
17 personal computer.

18 Q. Okay. And so you see an arrow that connects
19 client 100 to access point 160, right?

20 A. I see the arrow that goes between 160 and 100,
21 sir.

22 Q. So what's an example of an access point?

23 A. An access point is a device that communicates
24 with a Wi-Fi device on one side and on another

1 side communicates with a wired network.

2 Let me clarify this a little bit. First
3 of all, I'm referring to access point in the
4 Wi-Fi environment. Second, I am referring to an
5 example of the operation of the access point in
6 which in this example the access point
7 communicates, as I mentioned, on one side with a
8 Wi-Fi device, but at another side communicates
9 or connects to a wired network such as local
10 area network, for example. Those are just
11 examples of connectivity of the access point,
12 sir.

13 Q. Okay. I believe you used the term "Wi-Fi
14 device" in your answer. Did I hear you
15 correctly?

16 A. A device that is capable of communicating using
17 the Wi-Fi protocol, sir.

18 Q. And when you say "Wi-Fi protocol," what do you
19 mean by that?

20 A. So we typically refer to the acronym Wi-Fi as
21 referring to a system which supports the IEEE
22 802.11 type of protocol, sir.

23 Q. And you used the word "protocol" there. What do
24 you mean by "protocol"?

1 A. Okay. Let me be a little more accurate, then.
2 The Wi-Fi device is a device that is capable of
3 communicating using the 802.11 -- IEEE 802.11
4 standard, sir.

5 Q. And is there a difference between a standard and
6 a protocol?

7 MR. BELNAP: Objection, form.

8 A. One of the functions of the 802.11 standard is
9 to specify what we refer to as the 802.11
10 protocol, sir.

11 Q. And how does the 802.11 protocol relate to
12 communications between Client 100 and Access
13 Point 160 in Figure 1?

14 MR. BELNAP: Objection, form.

15 A. The Wi-Fi protocol relates to the
16 implementation -- between Client 100 and the
17 Access Point 160, refers to the implementation
18 of the 802.11 standard, sir.

19 Q. And does the 802.11 standard also relate to
20 communications between Access Point 160 and
21 Computer Network 165?

22 A. In my particular example that I mention in which
23 Access Point 160 on one side communicates Wi-Fi
24 with Client 100 and on the other side

1 communicates with Local Area Network 165 -- and
2 I mentioned in that example the Local Area
3 Network 165 is wired in my example -- then the
4 access point communication between -- the access
5 point communication between -- let me -- the
6 access point communication 160 to -- with the
7 wired LAN 165 is not based on the 802.11
8 standard, sir.

9 Q. Is there another standard that it's based on in
10 your example?

11 A. Yes, sir. The communication between -- the
12 communication between the one -- the network --
13 let me adjust the screen here, sir.

14 The Network 165 with -- the Network 165
15 is wired local area network, and the Access
16 Point 160 in that example would be based on
17 another IEEE standard. An example would be IEEE
18 802.3, which is typically referred to as the
19 Ethernet standard, sir.

20 Q. Okay. And is that also referred to as an
21 Ethernet protocol?

22 MR. BELNAP: Objection, form.

23 A. So that's a little bit difficult to answer
24 because in this field when we say Ethernet, we

1 often refer to the hardware, the network itself,
2 the connectivity, so to speak. And we sometimes
3 refer to the protocol itself, which is, of
4 course, standard -- defined by the standard. So
5 you need to give me a particular sentence for me
6 to explain what that particular sentence means
7 when it refers to the Ethernet term.

8 Q. Okay. So, for example, to be more precise,
9 then, in one example communications between
10 Access Point 160 and 165 could be governed by
11 the 802.3 protocol, if I understand you; is that
12 correct?

13 MR. BELNAP: Objection, form.

14 A. On one side Access Point 160 can connect to
15 wired local area network using the 802.3
16 standard, sir.

17 Q. Okay. Does the 802.3 standard define any
18 protocols?

19 A. I believe I answered this question already, sir.
20 The 802.11 standard defines what is referred to
21 in this field as the Ethernet protocol, sir.

22 Q. And does the 802.11 standard also define
23 protocols?

24 MR. BELNAP: Objection, form.

1 A. 802.11 standard defines protocols, sir.

2 Q. And what protocol does it define?

3 A. It defines protocol, for example, defines
4 protocol which we typically refer to as Wi-Fi.

5 Q. Now, is Wi-Fi capable of operating in more than
6 one mode?

7 MR. BELNAP: Objection, form.

8 A. I think, sir, what you are referring to is
9 explained in my declaration in paragraph 50 and
10 51. So paragraph 50 says, "A POA knew the
11 802.11 as highly successful and widely
12 deployed." And it goes on to discuss more about
13 the 802.11 protocol.

14 And then in paragraph 51 it says, "It
15 was known that 802.11 provided 'ad-hoc' and
16 'infrastructure' operations," sir.

17 Q. Okay. So with reference to Figure 1, we also
18 see another arrow between Client 100 and
19 Peer-to-Peer Device 180, right?

20 A. There is another arrow, sir, in this Figure 1
21 between Client 100 and a box which says
22 "Peer-to-Peer Device 180."

23 Q. And that arrow represents some form of
24 communication, right?

1 A. This arrow would represent some form of
2 communication, sir.

3 Q. And what is the nature of the communication
4 between Client 100 and Peer-to-Peer Device 180?

5 MR. BELNAP: Objection, form.

6 A. So if we look, for example, in column 3, line --
7 I believe it's 47, likely, 47 or maybe 48, then
8 it's a little bit confusing here, the line
9 numbers, when the client -- "when client 100's
10 Wi-Fi device is in adhoc mode, client 100 uses
11 adhoc driver 140 to send and receive information
12 to peer-to-peer device 180 over adhoc network
13 190," sir.

14 Q. And is that also used in the 802.11 protocol?

15 MR. BELNAP: Objection, form.

16 A. So in column 3, line 19, it says, "Client 100
17 uses a Wi-Fi device in 'infrastructure' mode at
18 intervals when client 100 is communicating in a
19 WLAN environment and client 100 uses the same
20 device in 'adhoc' mode at intervals when client
21 100 is communicating in a WPAN environment,"
22 sir.

23 Q. Do you see the circle 170 "Infrastructure
24 Network" on Figure 1?

1 A. Oh, I see the circle 1, sir, with the
2 "Infrastructure Network."

3 Q. Do you also see the circle "Adhoc network" in
4 Figure 1?

5 A. I see the circle "Adhoc Network 190," sir, in
6 Figure 1.

7 Q. What is the infrastructure -- I'm sorry. What
8 is the Infrastructure Network 170 in Cromer?

9 MR. BELNAP: Objection, form.

10 Q. Do you understand the question, Dr. Haas?

11 A. What is the infrastructure network?

12 Q. Yes.

13 A. So we sort of discussed this a moment ago. In
14 column 3, line 20, 19 or 20, "Client 100 uses a
15 Wi-Fi device in 'infrastructure' mode."

16 Then later, in line 25 or 26,
17 "infrastructure register 110," and so on and so
18 on, "that includes information regarding
19 infrastructure network 170."

20 So infrastructure network is a network
21 that operates in the Wi-Fi infrastructure mode,
22 sir.

23 Q. And it includes access point 160, right?

24 A. I'm a little reluctant to answer this one when

1 you say "includes." I'm not sure what you mean
2 by the word "includes."

3 The access point 160 uses the
4 infrastructure network 170 to communicate with
5 the client 100.

6 Q. Okay. And similarly, does the peer-to-peer
7 device 180 use the adhoc network 190 to
8 communicate with client 100?

9 A. The peer-to-peer device 180 uses the adhoc
10 network 190 to communicate with the client 100,
11 sir.

12 Q. How does Cromer describe allowing client 100 to
13 communicate at some times with an access point
14 160 and at other times with a peer-to-peer
15 device 180?

16 A. So we can go to column 3, sir, what I believe is
17 line 19, maybe 20. Again, it's a little bit
18 confusing, the numbering here. But I believe
19 it's 19. "Client 100 uses the Wi-Fi device in
20 'infrastucture' mode at intervals when client
21 100 is communicating in a WLAN environment and
22 client 100 uses the same device in 'adhoc' mode
23 at intervals when client 100 is communicating in
24 a WPAN environment."

1 Then we go down to what I believe is
2 Line 31, in the same column 3. "Client 100's
3 Wi-Fi device uses a watchdog timer to switch
4 between infrastructure mode and adhoc mode.
5 When client 100's Wi-Fi device switches to
6 infrastructure mode, client 100's Wi-Fi device
7 loads and uses information included in
8 infrastructure register 110. Likewise, when
9 client 100 switches to adhoc mode, client 100's
10 Wi-Fi device loads and uses information"
11 including -- "included in adhoc register 130."

12 So this is how client 100 uses
13 infrastructure mode and ad-hoc mode, sir, with
14 parts of its operation. Of course it included
15 other operations to work in both of those modes.
16 It's just an example of those operations.

17 Q. And why does -- why does Cromer do this? Why
18 does Cromer use the same device in both modes?

19 MR. BELNAP: Objection, form.

20 A. So go to line 16 in the same column 3. Figure
21 "1 is a diagram showing a client using a single
22 Wi-Fi device to concurrently operate in both a
23 Wireless LAN (WLAN) environment and a Wireless
24 Personal Area Network (WPAN)environment."

1 Q. Okay. And is there any -- does Cromer teach any
2 advantages to having a single Wi-Fi device
3 concurrently operating in both the wireless LAN
4 and wireless PAN environment over prior art
5 solutions?

6 A. So if we go, sir, to column 1 of Cromer, I
7 believe it's line 56, "What is needed,
8 therefore, is a system and method to support
9 concurrent infrastructure and peer-to-peer
10 environments using a single Wi-Fi device."

11 And this sentence or paragraph is in
12 response to the prior discussion in prior
13 paragraphs of the limitations of technology that
14 existed prior to Cromer, sir.

15 Q. And what are some of those limitations you
16 referred to?

17 A. So as an example, the last sentence of the prior
18 paragraph, column 1, which starts on line 45,
19 the last sentence says, "In order to support
20 simultaneous infrastructure and peer-to-peer
21 environments using Wi-Fi technology, two Wi-Fi
22 devices are required, one for each environment,
23 thereby increasing a computer system's cost."

24 So one such limitation -- if you wish to

1 use the word "limitation" -- of the technology
2 that existed prior to Cromer would require
3 computer system equipped with two Wi-Fi devices,
4 increasing a computer system's equipment cost,
5 sir. This would be one such example, sir.

6 Q. And so, for example, in Figure 1, Cromer allows
7 client 100 at times to communicate with access
8 point 160 and at times to communicate with
9 peer-to-peer device 180; is that right?

10 MR. BELNAP: Objection, form.

11 A. I'm not exactly -- I wouldn't use the word "at
12 times" in your question, because "at times"
13 would sort of maybe suggest that this concurrent
14 communication does not occur. So I would say
15 that it allows client 100 to concurrently use
16 the infrastructure network and the ad-hoc
17 network, sir.

18 Q. And can you explain how Cromer achieves what you
19 referred to as the concurrent operation?

20 A. Yes, sir. So I believe I answered that already,
21 but I'm happy to go to paragraph -- I'm sorry,
22 to column 3, line -- starting from line 19.
23 Again, I don't want to continue to repeat
24 myself. If I am off by one line, it's due to

1 the numbering, which is a little confusing here.

2 Q. Of course.

3 A. But from what I say it will be clear what I'm
4 referring to.

5 So it says here, "Client 100 uses a
6 Wi-Fi device in 'infrastructure' mode at
7 intervals when client 100 is communicating in a
8 WLAN environment and client 100 uses the same
9 device in 'adhoc mode' at intervals when client
10 100 is communicating in a WPAN environment."

11 And it goes on to describe the register
12 110 and register 130 where register 110 is the
13 infrastructure register and register 130 is the
14 ad-hoc register.

15 And then, as we discussed already
16 before, in column 7, line 21, "Controller 730
17 includes mode bit 735, timer 740, adhoc register
18 130, and infrastructure register 110."

19 And it -- again, the next sentence,
20 discusses "Client 100 checks mode bit 735 to
21 determine whether to be in single network mode
22 or dual network mode," and so on and so on. And
23 "timer 740 is used to identify times at which to
24 switch between modes."

1 So I think that those paragraphs explain
2 how client 100 operates concurrently in both
3 infrastructure network 170 and ad-hoc network
4 190, sir.

5 Of course there are much more discussion
6 in Cromer on this type of concurrent operation,
7 how it's done in the client 100, sir.

8 Q. But can client 100 ever be communicating with
9 access point 160 and at the same time be
10 communicating with peer-to-peer device 180?

11 MR. BELNAP: Objection, form.

12 A. So I'm going to refer to my declaration in
13 paragraph 136.

14 ..."a preliminary observation" -- I'm
15 sorry. Let me start again.

16 "As a preliminary observation, the
17 wireless [*sic*] LAN and wireless [*sic*] PAN
18 connections discussed below are '*maintained*' for
19 at least the same reasons discussed for the
20 "*maintain*" limitations," and so on.

21 So as far as we explained before, Cromer
22 taught the two connections were maintained at
23 times simultaneously with each other.

24 Then it says -- then it talks again in

1 paragraph 137, "Cromer taught *maintaining*
2 *simultaneous connections* at least *at times*
3 because it taught (i) 'concurrent' WPAN and WLAN
4 operations," and I'm skipping some quotations
5 here, somewhat here, and "(ii) including
6 concurrent 'communications' which required
7 concurrent connections, and (iii) 'maintaining'
8 one 'connection' (WLAN) in an idle state while
9 actively communicating over the other
10 connection. Thus, Cromer disclosed *maintaining*
11 both the *first and the second network*
12 *connections simultaneously* in multiple ways,
13 including for at least the periods in which
14 client device 100 was actively communicating
15 over the wireless [*sic*] PAN connection, while
16 preserving its wireless [*sic*] LAN connection
17 with AP 160," sir.

18 Q. Can client 100 send data to access point 160 and
19 simultaneously send data to peer-to-peer device
20 180?

21 A. As Cromer explains, the connection --
22 connections are maintained both on the
23 infrastructure network and the ad-hoc network at
24 the same time.

1 Q. So do you have an understanding of what it means
2 to send data across a communication link?

3 A. It's an ambiguous way that you describe it.
4 This is why I prefer to answer your question by
5 explaining that the client 100 can maintain
6 connections simultaneously with -- within the
7 infrastructure network and ad-hoc network, and
8 the ad-hoc network, sir.

9 Q. Well, how does -- how does Cromer send data in
10 the ad-hoc mode?

11 A. I don't understand the question, sir. What do
12 you mean, how it sends?

13 Q. Okay. So data in Cromer is being communicated,
14 for example, between client 100 and access point
15 160, right?

16 A. That's correct, sir.

17 Q. Tell me, at a physical level what is the nature
18 of that transmission?

19 A. The nature of this transmission is establishing
20 connection between client 100 and the ad-hoc
21 device 180 -- I'm sorry, and the peer-to-peer
22 device 180 over the ad-hoc network 190, sir.

23 Q. Okay. So are you familiar -- I assume you're
24 familiar with the OSI model of computing,

1 correct?

2 A. Of course sir.

3 Q. If I refer to layer 1, you'll know what I mean,
4 correct?

5 A. I understand what layer 1 in the OSI model is.

6 Q. Okay. So with respect to layer 1 in the OSI
7 model, how would you describe the nature of the
8 communication between client 100 and access
9 point 160?

10 A. With respect to -- with respect to the layer 1
11 of the OSI model, which we typically refer to as
12 a physical layer, the communication between
13 client 100 and the peer-to-peer device 180 is
14 sending communication over radio frequencies,
15 sir, some radio frequencies, sir.

16 Q. Okay. I understand. I'm trying to get more
17 precise in my questions so it's easier for you
18 to give a precise answer.

19 Do you have an understanding of what the
20 layer 2 of the OSI model is?

21 A. I definitely have understanding what layer 2 of
22 the OSI model is, sir.

23 Q. Can you summarize briefly what layer 2 of the
24 OSI model refers to?

1 A. So to be more precise, layer 2 is the data link
2 layer, but is also referred to in some networks
3 as the MAC layer, medium access control layer.
4 So it depends if you are talking about
5 point-to-point network -- I'm sorry,
6 point-to-point link, or we're talking about the
7 broadcast link in which the layer 2 applies to.

8 Q. Okay.

9 A. Of course I can talk for hours about layer 2,
10 but I'm sure you don't want me to spend hours
11 here on this topic.

12 Q. I understand.

13 So does the term "packets" mean anything
14 to you with respect to OSI layer 2?

15 A. A packet with respect to OSI layer 2 would
16 typically be referred to as a frame.

17 Q. And what is the -- what information, again, at a
18 general level, is contained in a layer 2 packet?

19 MR. BELNAP: Objection, form.

20 A. With respect to the OSI model, what is included
21 in the packet on layer 2 is the information
22 which is passed on from the network layer, which
23 is layer 3, to network 2; and layer 2 has its
24 own header to that information to create the

1 frame of layer 2, sir.

2 Q. So is it fair to say that in Cromer, client 100
3 sends packets to access point 160?

4 A. So it is right to say that client 100 sends
5 communications to access point 160. It's a data
6 link layer. Those communications are in the
7 form of frames -- in the form of frames, sir.

8 Q. And can client 100 also send information in the
9 form of frames to peer-to-peer device 180?

10 A. Client 100 would send communications to
11 peer-to-peer device 180, and those
12 communications on the second layer -- again, as
13 we call this data link layer, MAC layer -- would
14 be in the form of frames, sir.

15 Q. And these frames are ultimately transmitted on
16 layer 1 through a physical device, correct?

17 A. They are transmitted -- they are transmitted,
18 sure. I'm a little bit reluctant when you use
19 the word "physical device." What do you mean by
20 this? But those frames are transmitted, yeah,
21 right, over layer 1.

22 Q. And can a client 100 transmit a frame to access
23 point 160 simultaneously with transmitting a
24 frame to peer-to-peer device 180?

1 MR. BELNAP: Objection, form.

2 A. So I'm going to answer your question the
3 following way, if you will allow me, sir. If I
4 go to my declaration, sir, the claim language
5 1E, as an example, talks about maintaining at
6 least the first network connection using a first
7 network protocol, and the second network
8 connection using a second network protocol that
9 can be maintained at least simultaneously with
10 each other. What is required by the claim
11 language, 1E, in the -- well, what is required
12 by the element 1E of the claim language, those
13 two connections would be maintained at times
14 simultaneously with each other.

15 Q. Let's turn to figure 7, if we could.

16 A. I believe you are referring to figure 7 in
17 Cromer, sir?

18 Q. That's correct. Thank you.

19 A. I am on figure 7 in Cromer, sir.

20 Q. You'll see within the Wireless Interface 710,
21 the Transceiver 715.

22 Do you see that, sir?

23 A. Yes, I do, sir.

24 Q. Underneath that feeding into the transceiver is

1 a transmission first in first out unit 720 and
2 RX FIFO 725, right?

3 A. I see the 720 and 725, sir.

4 Q. Then transceiver 715 feeds into element 755. Do
5 you understand element 755 to be an antenna?

6 A. I understand element 755 to be an antenna, sir.

7 Q. So that 755 is an antenna. I just wanted to
8 make sure if I misspoke about the number. Would
9 you agree with that?

10 A. 7-5-5. 755 is an antenna, sir.

11 Q. Okay. And 755 is part of the physical layer,
12 correct?

13 A. 755 is an antenna which is used to transmit a
14 signal, sir.

15 Q. So my question is, being very specific about it,
16 is antenna 755 capable of simultaneously
17 transmitting a frame to ad-hoc network 190 and
18 another frame to infrastructure network 170?

19 MR. BELNAP: Objection, form.

20 A. So your question was, whether antenna is
21 capable -- you used the word "capable," if I
22 remember correctly. Please correct me if I'm
23 wrong. You said it's capable of transmitting
24 two signals, one on network 190 -- is capable of

1 transmitting two signals on two different
2 networks. Am I correct in your statement -- in
3 your question, sir?

4 Q. Yes.

5 A. In general the answer is yes. However, this is
6 not how Cromer operates. You asked me what it's
7 capable of, whether it's possible to take one
8 antenna and at the same time using one antenna
9 transmitting two signals. The answer is yes,
10 it's possible. Not at the same frequencies.
11 Not at the same RF frequencies. Clearly if you
12 transmit two signals at the same RF frequencies,
13 you are going to get likely not a very good
14 signal, so to speak. But it is possible to
15 transmit by one antenna two different signals at
16 two different frequencies, yes, sir.

17 Q. Okay. But that's --

18 A. I'm not referring to the operation of Cromer.
19 I'm just saying to answer your question about
20 capability in general of antenna or antennas.

21 Q. But that's not what Cromer does, you're saying;
22 is that right?

23 A. This is not how Cromer operates, sir.

24 MR. COGSWELL: Okay. We've been going

1 for about another hour. Let's take another
2 ten-minute break and convene back at 12:15
3 eastern time.

4 MR. BELNAP: Thank you.

5 MR. COGSWELL: Thank you.

6 (Recess.)

7 MR. COGSWELL: We're back on. Is
8 everyone ready to resume?

9 MR. BELNAP: I'm ready.

10 Dr. Haas, are you ready?

11 THE WITNESS: Yes, sir, I'm ready.

12 MR. COGSWELL: Thank you, Dr. Haas.

13 BY MR. COGSWELL:

14 Q. If you would please turn to Figure 1 of Cromer,
15 I have a couple more questions as we finish up.

16 A. I'm on Figure 1 of Cromer, sir.

17 Q. You'll see that Figure 1 of Cromer shows in box
18 client 100 two drivers, namely an infrastructure
19 driver 120, and an ad-hoc driver 140.

20 Do you see that?

21 A. Infrastructure driver 120 and ad-hoc driver 140,
22 sir.

23 Q. So client 100 can certainly send data through
24 ad-hoc driver 140, right?

1 A. Sometimes client 100 sends data through ad-hoc
2 driver 140.

3 Q. Okay. And during those times when client 100
4 sends data through ad-hoc driver 140, what is
5 the status of infrastructure driver 120?

6 A. So I'm referring to column 3, line 53. "During
7 intervals when client 100's Wi-Fi device is in
8 infrastructure mode, adhoc driver 140 is
9 inactive and code shim 150 acts as a virtual
10 adhoc device driver to client 100's operating
11 system. Likewise, when client 100's Wi-Fi
12 device is in adhoc mode, infrastructure driver
13 120 is inactive and code shim 150 acts as a
14 virtual infrastructure device driver to client
15 100's operating system." And then it refers to
16 figures 2 and 3.

17 Q. When infrastructure driver 120 is inactive, can
18 client 100 send data to access point 160?

19 MR. BELNAP: Objection, form.

20 A. I'm a little bit reluctant to answer your
21 question because you need to be more accurate --
22 maybe I could -- more implicit, so to speak,
23 about the -- about what does it mean, send
24 information to.

1 Do you mean -- client 100 can generate
2 information to driver 120, yes.

3 Q. Driver 120 -- I'm sorry, I didn't mean to
4 interrupt you.

5 A. When driver -- when the client 100 is in ad-hoc
6 mode, software in the client 100 can still
7 generate data for the infrastructure network.

8 Q. So what is the consequence in that situation of
9 the infrastructure driver 120 being inactive
10 when client 100 sends data to it?

11 MR. BELNAP: Objection, form.

12 Q. Do you understand the question?

13 A. I understand the question, yes, sir.

14 One of ordinary skill in the art would
15 have understood that when Cromer talks about
16 infrastructure driver 120 being in an inactive
17 mode, meaning that infrastructure driver 120
18 does not communicate data to the adapter.

19 Q. I'm sorry, I didn't hear the last part. Does
20 not communicate data to the...

21 A. Adapter. Adapter.

22 Q. Adapter?

23 A. Yes.

24 But it does not mean that client 100

1 cannot generate data to the infrastructure
2 network.

3 Q. Does Cromer make reference to an adapter of any
4 kind?

5 A. Maybe I would have to reread Cromer again --
6 Cromer again and see whether Cromer uses the
7 word "adapter" specifically, yes or no. But
8 there is a certain level of understanding that
9 one of ordinary skill in the art would have had
10 reading Cromer and what it means when it refers
11 to a particular term.

12 Q. Okay.

13 A. So my statement is that one of ordinary skill in
14 the art would have understood this operation of
15 the client 100 with respect to the
16 infrastructure devices such as access point does
17 not cease because the client 100 right now
18 communicates over ad-hoc network. Client 100
19 can continue to generate information with
20 respect to the infrastructure devices, access
21 points, even though the client right now is
22 communicating information over its ad-hoc
23 network.

24 Q. But that information is not being sent to access

1 point 160 when infrastructure driver is
2 inactive, correct?

3 MR. BELNAP: Objection, form.

4 A. When the client 100 is in ad-hoc mode in Cromer,
5 the information goes over ad-hoc network.

6 Q. And when client 100 is in infrastructure mode,
7 the information goes over the infrastructure
8 network, correct?

9 A. When client 100 is in the infrastructure mode,
10 the information which is being sent from the --
11 excuse me -- the information goes from the
12 client over the infrastructure network.

13 Q. Okay.

14 A. But again, I want to emphasize, so that there's
15 no misunderstanding between us, that just
16 because a client is in a particular mode, the
17 connection from the other network continues to
18 be maintained. That's required by the claim
19 language that I mentioned before.

20 Q. Thank you, Dr. Haas.

21 Let's move now to the Ganu reference,
22 which is Exhibit 1005. I'll give you a minute
23 to pull that up.

24 A. I am on Exhibit 1005, which I believe you

1 referred to, which is the Ganu reference, sir.

2 Q. So Ganu relates, at least according to its
3 title, to "802.11-Based Self-Organizing
4 Hierarchical Ad-Hoc Wireless Network (SOHAN)."

5 Do you see that?

6 A. I see these words in the title of the reference
7 Ganu, sir.

8 Q. So what is a self-organizing hierarchical ad-hoc
9 wireless network?

10 A. With respect to the reference of Ganu, when Ganu
11 refers to hierarchical ad-hoc wireless network,
12 it refers to ad-hoc network which is built
13 around hierarchy; there's a hierarchy in it.

14 Q. And explain what you mean by "hierarchy," if you
15 would, please.

16 A. So if we look at the abstract of Ganu, which is
17 at Page 880, in the left column, I believe the
18 second sentence of the abstract says, "The
19 proposed network has a three-tier hierarchy
20 consist of low-power *mobile nodes* (MNs) at the
21 lowest layer, *forwarding nodes* (FNs) with higher
22 power and multiple-hop routing capability at the
23 middle layer, and wired *access points* (APs)
24 without power constraints at the highest layer."

1 Q. Okay. Is there any advantage achieved by having
2 that kind of hierarchical organization as
3 opposed to having an absence of hierarchy?

4 MR. BELNAP: Objection.

5 A. So let's -- let's go to, again, to the
6 reference, Page 80, the left column -- I'm
7 sorry, I apologize. Reference of Ganu on Page
8 880. The left column under the section
9 Introduction. The second paragraph -- I'm
10 sorry, the first paragraph, I believe again
11 sentence No. 2, the second sentence, "The
12 proposed hierarchical ad-hoc network is
13 motivated by the fact that flat ad-hoc
14 architectures do not scale well as the number of
15 radio nodes becomes large."

16 Then there's a reference 1 here, which
17 is reference to the paper by Gupta and Kumar.

18 "In addition, most realistic usage" -- I
19 continue to read the paragraph 1 of
20 Introduction. "In addition, most realistic
21 usage scenarios involve predominant mobile
22 device traffic flows to and from the wired
23 Internet, thus allowing [sic] effective
24 integration of wired 'access points' -- 'access

1 points' with the ad-hoc wireless network nodes."

2 It goes on to say, "The approach" -- the
3 next part, "The approach adopted here is based
4 on a multi-tier hierarchy that scales well and
5 integrates naturally with existing wireless
6 access points or base stations, while retaining
7 much of the robustness, coverage and power
8 advantages of ad-hoc wireless networks." The
9 application -- "This architecture is applicable
10 to a number of emerging ad-hoc network
11 scenarios," and so on and so on.

12 Then it says, next sentence, "In each of
13 the scenarios, the introduction of one or more
14 tiers of ad-hoc forwarding nodes (FN) as
15 intermediate radio relays between the MNs and
16 APs helps to scale network throughput, reduce
17 delay and lower power consumption at end-user
18 devices."

19 So those are some of the advantages that
20 Ganu points out to using the hierarchy in his
21 architecture, sir.

22 Q. Okay. So let's say that we're in the prior art
23 era to Ganu and we don't have a hierarchical
24 ad-hoc wireless network and what we have is a

1 number of nodes and they're associated in an
2 ad-hoc network architecture. Okay?

3 How would they -- how would they communicate
4 with each other and with the access point? Is
5 there a set of rules that governs those
6 communications?

7 A. Well, sir, when we talk about set of rules in
8 communication, we typically refer to a protocol.
9 So, yes, there were protocols prior to Ganu that
10 governed communications in ad-hoc networks and
11 different operations of ad-hoc networks as well.
12 So Ganu did not invent ad-hoc networks, if this
13 is what you are referring to. When I mean Ganu,
14 I mean the reference Ganu.

15 Q. Okay. And in an infrastructure mode
16 implementation of the 802.11 protocol, again in
17 the absence of hierarchy, how is it decided when
18 each mode gets a chance to speak, if you will?

19 MR. BELNAP: Objection, form.

20 A. Are you referring, sir, to Ganu?

21 Q. No, just in the prior art to Ganu.

22 A. You would, sir, need to show me a particular
23 reference for me to tell you how this reference
24 operates and how the protocol is being chosen

1 for a particular operation. I cannot speak in
2 general because there may be different
3 implementations, sir.

4 Q. Would an access -- in an infrastructure mode
5 implementation on the 802.11 protocol, is there
6 any access point involved?

7 A. In the infrastructure mode of 802.11 protocol,
8 any access point involved? Is this your
9 question, sir?

10 Q. Yes.

11 A. It is typically assumed that when 802.11
12 protocol operates in the infrastructure mode,
13 there is an access point present, sir. That's a
14 typical operation of 802.11 in infrastructure
15 mode.

16 Q. And how about when there is not an access point
17 present, when there's not an access point
18 present, would 802.11 be operating in ad-hoc
19 mode?

20 MR. BELNAP: Objection, form.

21 A. I think we have a little bit of a
22 misunderstanding, what does it mean to operate
23 in a mode in your question. It's a designer
24 choice of a device how a device operates or

1 switch between modes. It doesn't happen, you
2 know -- how do you say? It doesn't happen
3 without any design process in the system,
4 designed process in the system.

5 So I'm just a little bit confused by
6 your question because, you know, it's just a
7 little bit strange the way that you posed it,
8 sir; with all due respect, of course.

9 Q. So there is a -- if you look at Figure 1 of
10 Ganu.

11 A. Yes, sir.

12 Q. You'll see that shows a three-tier ad-hoc
13 network architecture, right?

14 A. Yes, I see, sir, three tier ad-hoc network
15 architecture, sir.

16 Q. And you'll see that there are arrows, either fat
17 arrows or skinny arrows in that diagram.

18 Do you see that?

19 A. I see the different thickness of the arrows,
20 sir.

21 Q. Okay. And those denote either low-tier access
22 links or ad-hoc links between FNs and APs,
23 right?

24 A. That is correct, sir. There is a legend, so to

1 speak, on the side of the figure that would
2 indicate that the thick arrows are for ad-hoc
3 links, which mean the forwarding nodes and the
4 access point, and the thin arrows are the
5 low-tier access links, sir.

6 Q. An example of a mobile node is a mobile end user
7 device, right?

8 A. Mobile node in Ganu has low-tier devices, sir --
9 end user devices, sir.

10 Q. And the forwarding node routes traffic from the
11 mobile node to another node; is that fair?

12 MR. BELNAP: Objection, form.

13 A. The forwarding nodes forward traffic from the
14 mobile nodes, sir, among other things -- among
15 other things that it does.

16 Q. Does Figure 1 show a single network?

17 A. Figure 1 shows three tier ad-hoc network
18 architecture of Ganu.

19 Q. And would you consider that three tier network
20 architecture to comprise three tiers of a single
21 network?

22 A. As I said, Figure 1 shows three tier ad-hoc
23 network architecture.

24 Q. And would you consider that three tier ad-hoc

1 network architecture to be three tiers of a
2 single network?

3 MR. BELNAP: Objection, form.

4 A. There are three tiers of one ad-hoc network
5 architecture. However, a network can be
6 composed of other networks. So just because
7 it's an ad-hoc network architecture does not
8 mean that you cannot identify other networks
9 within this ad-hoc network architecture, sir.

10 Q. Okay. What about in Figure 1, how many networks
11 can you identify in Figure 1?

12 A. I really cannot answer the question, sir. There
13 are three tiers, that's what I can identify
14 here.

15 Q. So you don't have -- you were referring in your
16 answer, I believe, to networks. And with
17 respect specifically to Figure 1, can you
18 identify in Figure 1 more than one network?

19 A. Yes, I can identify in Figure 1 more than one
20 network.

21 Q. Okay. What networks can you identify in Figure
22 1?

23 A. As an example, there's Internet in Figure 1,
24 which is a network.

1 Q. Okay.

2 A. It's a big network. That's one network.

3 Q. Yup. Can you identify any other networks in
4 Figure 1?

5 A. I have not considered this question how to
6 identify other networks in Figure 1, sir. I
7 would have to think a bit more how to answer
8 your question, sir.

9 Q. Okay. So sitting here right now, you're unable
10 to form an opinion as to whether or not you can
11 identify any network in Figure 1 other than the
12 Internet?

13 MR. BELNAP: Objection, form.

14 A. As I said, I can definitely identify a three
15 tier ad-hoc network architecture in Figure 1.

16 Q. And let me ask it this way: Besides the
17 internet -- strike that.

18 How many wireless networks can you
19 identify in Figure 1?

20 A. I can identify around each forwarding node being
21 connected to a collection, a set of other nodes.
22 I can then identify forwarding nodes being
23 connected to other forwarding nodes. I can also
24 identify forwarding nodes being connected to an

1 access point, or access points, so to speak.
2 And those networks -- those connections of those
3 elements, forwarding nodes in particular, are
4 marked in the Figure 1 as circles. So you can
5 see a circle around each one of the forwarding
6 nodes. This circle identifies the coverage of
7 this forwarding node in terms of its
8 connectivity to other nodes.

9 Q. Is it your understanding that the reference in
10 Figure 1 to all three or to three tiers refers
11 to Ganu's ad-hoc APs, ad-hoc MNs, and ad-hoc
12 FNs?

13 A. The three tiers -- as Ganu says in the abstract,
14 the proposed network is a three tiered
15 consisting of low power mobile nodes at the
16 lowest level, forwarding nodes -- and I'm
17 skipping some text here, of course -- with
18 higher power in the middle layer, and wireless
19 access points without power constraints at the
20 highest layer.

21 Q. And would you agree that Ganu's forwarding nodes
22 are responsible for routing traffic in Ganu's
23 ad-hoc network to and from ad-hoc FNs, ad-hoc
24 APs, and ad-hoc MNs?

1 A. The forwarding nodes forward traffic in Ganu
2 from the mobile nodes to other forwarding nodes
3 or from the mobile nodes to AP or APs, and that
4 would typically forward to one AP -- a
5 forwarding node would typically forward traffic
6 to one AP if it does forward to AP. Forwarding
7 node can also forward traffic from a mobile node
8 to another mobile node in its coverage.

9 Q. And according to Ganu, how does the forwarding
10 node decide where to send to?

11 A. Do you mean where to send particular traffic,
12 sir?

13 Q. Yes.

14 A. So the communications in Ganu would have
15 address. So we would have a packet, as an
16 example, which has an address. The address in
17 that packet would indicate what is the
18 destination of the packet. And the forwarding
19 node would then decide how to forward a packet
20 based on the address in the packet, sir.

21 Q. And how does the forwarding node make that
22 decision, in addition to using -- strike that.

23 In addition to relying on the address in
24 the packet, does the forwarding node rely on

1 anything else in deciding where to forward the
2 packet to?

3 A. Presumably there is some software in the node
4 that would perform the forwarding operation,
5 sir.

6 Q. And without that software, would the forwarding
7 node be able to perform forwarding operations?

8 MR. BELNAP: Objection, form.

9 A. We are now, you know, moving into a realm of
10 hypothetical questions. Are you asking me
11 whether the node, forwarding node doesn't have
12 any software in it? No control at all?

13 Q. No. What I'm -- let me approach this from a
14 different angle.

15 What I'm getting at is whether the
16 forwarding node consults any routing table in
17 making decisions? Do you have an understanding
18 of whether or not Ganu uses a routing table with
19 respect to the operation of its forwarding node?

20 A. So, first of all, Ganu has what's called
21 neighbor, neighbor, which Ganu relies on. And
22 as an example, in column -- on Page 882 on
23 the -- in the right column, paragraph one, two,
24 three from the top, it talks about, "For DSDV,

1 the 'forwarding table' at each node could be
2 replaced by the neighbor table provided by
3 discovery, while in AODV (or DSR), the route
4 requests could be propagated only to a subset of
5 nodes," and so on and so on, "by the discovery
6 mechanism."

7 So Ganu talks about routing tables, yes,
8 the possibility of having routing tables in the
9 forwarding nodes -- I'm sorry, having forwarding
10 tables in the routing nodes, if I misspoke.

11 Q. And is there a difference between forwarding and
12 routing?

13 A. Yes. Forwarding is not the same as routing,
14 sir.

15 Q. And what's the difference between forwarding and
16 routing?

17 A. It's a different operation, sir.

18 Q. Okay. And in what way is it a different
19 operation?

20 MR. BELNAP: Objection, form.

21 A. "Forwarding" refers to moving a packet from an
22 input to an output of a node. "Routing" refers
23 to routing a packet from a source to a
24 destination, sir.

1 Q. Is different information used in forwarding and
2 in routing?

3 A. If I understand your question correctly, is
4 different information used to perform routing
5 than to perform forwarding? Is this the
6 question?

7 Q. Yes. Yes.

8 A. Those are different operations. Forwarding, as
9 I mentioned, is taking packet from an input and
10 forwarding it on to an output. That's
11 forwarding.

12 Q. And what is routing again?

13 A. Routing is taking a packet from the source to
14 the destination.

15 Q. In Ganu, do the forwarding nodes generate any
16 traffic of their own?

17 A. I have to read Ganu again to give you a definite
18 answer whether in Ganu -- where Ganu mentions or
19 does not mention what the forwarding nodes --

20 Q. That was the question.

21 A. If you would allow me just to finish this here.

22 Q. Sure.

23 A. Whether Ganu does or does not mention the
24 forwarding node generating traffic of their own

1 or not, I can not remember. If you point me in
2 my declaration where I discuss it, I will be, of
3 course, happy to mention it or explain it
4 further. But I want to clearly mention that the
5 operation that I rely on from Ganu in my
6 declaration is limited to certain features of
7 Ganu with respect to the operations of
8 forwarding node.

9 Q. Okay. Let's, I guess, go in that direction for
10 a moment. What are the certain features that
11 you relied on?

12 A. So I can, as -- by way of example -- examples, I
13 can mention those features. Again, I am just
14 discussing some examples of the features that I
15 referred to from Ganu in my declaration.

16 So, for example, in paragraph 85 on my
17 declaration, "A POSA would have found it obvious
18 to combine the forwarding node's *[sic]* data
19 forwarding techniques of Ganu with Cromer such
20 that Cromer's client 100" relied -- I'm sorry --
21 "relayed--or, forwarded--data between access
22 point 160 and peer-to-peer device 180."

23 So that's clear it's a forwarding
24 technique of Ganu with respect to the forwarding

1 node. But a forwarding feature of Gnu --
2 Gnu's forwarding nodes is something that I rely
3 on in my declaration.

4 Another feature that I rely on in my
5 declaration. Let's go for a moment to paragraph
6 130. I'm sorry, 131 more precisely. I am
7 talking about appending transmit power and
8 appending the received power strength, signal
9 strength -- I'm sorry, append the transmit power
10 and append the received signal strength in the
11 beacons. So this would be in paragraph 131. It
12 is here I am replicating the figure from Gnu
13 with the transmit power and the receive power
14 appended.

15 Another feature -- another feature that
16 I refer to is the association between the
17 forward nodes and the mobile nodes in Gnu. So
18 actually this is also discussed in paragraph 80,
19 if you would look at page 48. At the bottom of
20 page 48, I'm talking about "using two new power
21 fields" -- 'Transmit Power' [sic] and 'Receive
22 Power' [sic] -- "appended to the 802.11 MAC
23 beacon frames and (2) adding 802.11 1-like
24 association to the ad-hoc protocol."

1 So those are the features which
2 I recall right now as examples that I rely on
3 from Ganu in the -- in my declaration with
4 respect to the combination of Cromer and Ganu,
5 sir.

6 MR. COGSWELL: Actually, this might be a
7 good time to do a lunch break. It's about 1:15
8 our time. It's almost 12:15 your time.

9 THE WITNESS: Yes, sir. It's -- my
10 watch is 12:12.

11 MR. COGSWELL: Okay. Why don't we take
12 a lunch break now. We can go off the record.

13 (Discussion off the record.)

14 (Luncheon recess.)

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1 AFTERNOON SESSION

2 MR. COGSWELL: If we're ready to start,
3 we can go back on the record.

4 MR. BELNAP: Yes, I'm ready.

5 Dr. Haas?

6 THE WITNESS: Yes, I'm ready.

7 BY MR. COGSWELL:

8 Q. Hello, Dr. Haas. Welcome back.

9 A. Thank you, sir.

10 Q. Let's move on a little to Page 3 of the Ganu
11 reference, which is actually Page 882.

12 A. I'm on Page 882, sir.

13 Q. In the left-hand column there is a paragraph,
14 very last paragraph that starts with the heading
15 "Discovery metric."

16 Do you see that paragraph?

17 A. Yes, I do, sir.

18 Q. Can you take a moment and read that to yourself
19 and let me know when you're done, please.

20 A. I read it, sir.

21 Q. Would you agree that this passage means that
22 Ganu's ad-hoc MNs save power by associating with
23 the best cost parent?

24 A. Ganu reduces the energy use by choosing the

1 least cost forward node, but -- mobile node
2 choosing the least cost forward node with the
3 least cost in Ganu was based on energy
4 considerations.

5 Q. Is the best cost parent the ad-hoc FN or AP that
6 requires the least power to reach?

7 A. The node -- the minimum transmit power was
8 chosen to be -- the node to the minimum transmit
9 power was chosen to be the node to be associated
10 with.

11 Q. And Ganu's ad-hoc network does not include any
12 infrastructure mode access points, right?

13 A. In Ganu, Ganu does not use the infrastructure
14 mode with the operation of his forwarding nodes.

15 Q. And he doesn't use the infrastructure mode in
16 connection with his access points either, right?

17 A. Well, I mean, inherently the AP would possess
18 the ability to use the infrastructure operation
19 mode; however, the operation of Ganu does not
20 rely on this infrastructure mode for its AP
21 operation.

22 Q. Okay.

23 A. But, however, if I may add, again, I do not rely
24 or I rely on specific features -- excuse me,

1 specific features from Ganu in my analysis, in
2 my declaration, and those features were the
3 features that we had the pleasure to discuss
4 before the break.

5 Q. And Ganu doesn't disclose using any kind of
6 overlay network, correct?

7 MR. BELNAP: Objection, form.

8 A. You use the term "overlay," sir. I -- could you
9 be more specific, what do you mean by "overlay"
10 in your question, sir?

11 Q. Do you have an understanding of what an overlay
12 protocol is?

13 MR. BELNAP: Objection, form.

14 A. The term "overlay" can be used in different
15 meanings and different contexts, so I don't know
16 what is your use of the term "overlay" in your
17 question, sir.

18 Q. Okay. Let's turn to page -- let's look at Page
19 882. There is a section there in the second
20 column entitled "Routing."

21 Do you see that?

22 A. Yes, I do, sir, at Page 882 of Ganu, sir.

23 Q. What is your understanding generally of what's
24 described by Ganu in the section entitled

1 "Routing"?

2 MR. BELNAP: Objection, form.

3 A. So as Ganu says in his first sentence, and I
4 quote from the middle of the first sentence, "We
5 have implemented a distance-vector based routing
6 protocol that uses the 'logical' topology
7 information presented by the discovery mechanism
8 in order to create and maintain local neighbor
9 tables at each of the" forwarding nodes "and
10 APs." This is what Ganu states with respect to
11 his implementation of the routing -- of the
12 local neighbor tables.

13 Q. And this section describes in part routing
14 between forwarding nodes and APs, right?

15 A. The paragraph states here, "The routing protocol
16 involves two phases: 1) Neighbor Table
17 Formation, and 2) Periodic Table Update and
18 Exchange."

19 This is the routing protocol in Ganu
20 forming the tables.

21 I also would like to point you to the
22 last paragraph in this section, "After the table
23 exchanges, each" forwarding node "computes a
24 path that it can use to route data to the AP.

1 The" forwarding node" maintains a latest best
2 cost path towards the AP in every instant and
3 whenever it receives data," blah, blah, blah,
4 "it consults the neighbor table to forward the
5 data to the next hop on the appropriate channel
6 and interface."

7 So most of the routing operation, not
8 exclusively, but most of the routing operation
9 in Ganu is creating the formation of the
10 neighbor tables. But of course it also involves
11 a routing operation itself which again is
12 discussed here in paragraph -- the last
13 paragraph and the one before the last paragraph,
14 sir.

15 Q. And in that last paragraph, there's a sentence
16 that says, starts with, "If an FN is
17 disconnected from the network."

18 Do you see that sentence?

19 A. Yes, I see it.

20 Q. Okay. What does that mean? What is Ganu saying
21 in that sentence?

22 A. So let me read the sentence and then I can
23 explain it.

24 "If an FN is disconnected from the

1 network (there is no entry for an AP that exists
2 in its neighbor table), it discards the packet
3 and indicates a routing failure."

4 There is really nothing special here, so
5 to speak. This is how essentially every --
6 well, this is how essentially typical packet
7 switch networks operate. When there's no
8 information how to route the packet, then the
9 node cannot do anything with this packet and it
10 typically discards the packet. This has to do
11 with disconnections, for whatever reasons there
12 may be, but the sentence is nothing special. It
13 really -- this is how packet switch networks
14 operate. So yeah.

15 Again I want to emphasize again that in
16 my analysis of the claims from the '991 patent,
17 in using Ganu, I relied only on very particular
18 features from Ganu to be used for the benefit of
19 Cromer's system. So said differently, the
20 person of ordinary skill in the art would have
21 understood that Ganu has some beneficial
22 features that could be used in Cromer. And
23 those features, the POSITA would have then
24 incorporated into the system of Cromer in order

1 to improve the operation of Cromer.

2 Q. And in that -- in this proposed combination,
3 would you have Cromer's client 100 act as a Ganu
4 forwarding node by relaying data between
5 Cromer's WPAN and Cromer's WLAN?

6 A. In my combination of Cromer and Ganu, I would
7 use, among other features that I used from Ganu,
8 I would use the feature of forwarding that Ganu
9 implements in its forwarding nodes. I would use
10 the feature of forwarding in Cromer's client
11 100, to be more precise, the POSITA would have
12 used such a feature in Cromer's client 100 to
13 improve the operation of Cromer's system. So
14 the feature forwarding -- again, among other
15 features we had the pleasure to discuss -- that
16 I take -- took from Ganu, such feature
17 forwarding benefit the system of Cromer.

18 Q. And what benefit would it provide, Dr. Haas?

19 MR. BELNAP: Objection, form.

20 A. So if you will allow me to go to my declaration
21 and just by way of an example of the benefits
22 that I discuss from incorporating the features
23 of Ganu into Cromer's system, in paragraph 134 I
24 discuss, "Furthermore, it would have been

1 obvious to use Ganu's teaching to modify
2 Cromer's WPAN connection while retaining
3 Cromer's WLAN connection. For example, doing so
4 would have had the readily apparent benefit of
5 being able to communicate with the existing base
6 of the 802.11-compliant access points already
7 installed in the marketplace, avoiding the need
8 for a potential customers to replace their
9 access points."

10 I skip some.

11 "Moreover, a POSA would have" had --
12 "would have been motivated to maintain Cromer's
13 embodiment where the connected AP had an '802.11
14 compliant wireless local area network interface'
15 for," then skipping, "Finally, a POSA would have
16 recognized that the power savings taught by Ganu
17 were most beneficial to WPAN environments known
18 to commonly include short-range, battery-powered
19 devices such as Cromer's WPAN handheld devices
20 and PDAs."

21 Again, skipping some material here.

22 Ganu, taught its solution provided
23 'energy conservation at the [mobile nodes] MNs'
24 benefitting the energy constraints of typical

1 'battery-operated' devices."

2 While reading this, I skipped some
3 material. I just want you to be aware that I
4 didn't read every letter here, especially
5 omitting the citations and so on.

6 But those are some benefits that Ganu
7 features, some Ganu features would offer the
8 Cromer system and a POSITA would have easily
9 recognized those benefits and incorporated those
10 features that again we had the pleasure to
11 discuss before into Cromer's system.

12 Q. Thank you, Dr. Haas.

13 A. My pleasure, sir.

14 Q. Let's go into another figure in Ganu. Figure 5,
15 please.

16 A. I am on figure 5, sir.

17 Q. So figure 5 you'll see is embedded in this
18 section of Ganu at Page 883, first column
19 entitled "Software Architecture and Protocol
20 Implementation," right?

21 A. Yes, sir.

22 Q. And this describes several layers, correct?

23 MR. BELNAP: Objection.

24 A. Figure 5 shows application about routing, which

1 is about discovery and so on.

2 Q. Okay. So what's going on in figure 5?

3 A. I am not exactly sure what you mean, "what's
4 going on."

5 Those are the different layers of the
6 software architecture of the network which are
7 implemented in Ganu's prototype.

8 Q. So, for example, we have some stack at the left
9 which has "libnet" on the lowest layer and
10 "ap.fn.sensor.c" at the highest layer.

11 Do you see that?

12 A. Yes, I do, sir.

13 Q. And then there's an identical block of stacks on
14 the right-hand side of figure 5.

15 Do you see that?

16 A. Yes, I see that, sir.

17 Q. And then there is a double arrow showing a
18 connection between the libnet block of each of
19 those two boxes.

20 Do you see that?

21 A. I see what you're referring to as the arrow,
22 yes.

23 Q. Do you have an understanding of what the boxes
24 on the left and right of figure 5, namely

1 containing the stack of libnet through
2 ap.fn.sensor.c corresponds to in Ganu?

3 MR. BELNAP: Objection, form.

4 A. The ap, fn, and sensor.c are the sensor
5 forwarding node in the AP applications.

6 If you look down, it says "Application
7 Layer, and in parenthesis you have "sensor.c
8 forwardingnode.c and ap.c." Those are the
9 sensor, the FN, and the sensor.c in figure 5.

10 And it says, "This layer handles the
11 application specific functionality that depends
12 on the type of the nodes."

13 Q. So in figure 5, do you understand that each of
14 the stacks from libnet through ap.fn.sensor.c
15 corresponds to a node?

16 A. Each one of those stacks is implemented on one
17 of the nodes in the SOHAN architecture, at least
18 in the prototype.

19 Q. And layer2.c handles the discovery and MAC layer
20 functionality, correct?

21 A. That's correct. Layer2.c handles the discovery
22 and MAC layer functionality, sir.

23 Q. And whenever a packet arrives in the lower
24 layer, Ganu teaches that this layer handles the

1 packet processing and passes the information to
2 the higher layers, correct?

3 A. This is typically how protocol layers are --
4 operate, meaning the layer in the protocol uses
5 the services of the layer below it and offers
6 services to the layer above it.

7 MR. COGSWELL: Can we just go off the
8 record for a minute.

9 (Discussion off the record.)

10 MR. COGSWELL: Let's go back on the
11 record.

12 Q. So we were talking, I believe, Dr. Haas, about
13 layer2.c. And Ganu -- strike that.

14 What layer or layers does the 802.11
15 protocol operate in?

16 MR. BELNAP: Objection, form.

17 A. In general, 802.11 is a MAC layer protocol,
18 mostly. But 802.11 has features which are not
19 only relate to MAC layer protocol. But 802.11
20 has features on the MAC layer. Okay?

21 It's a little bit difficult to answer
22 your question because -- well, for several
23 reasons, one reason being that the different
24 functionalities can be implemented in different

1 places. Okay? So I don't want to be saying,
2 well, the whole 802.11 is implemented in this
3 one. Okay?

4 Q. Fair enough. Let's go to figure 4 of Ganu, if
5 we can.

6 A. Yes, sir. I'm on figure 4.

7 Q. What -- how would you describe -- strike that.

8 There are two parts in figure 4.

9 There's a box to the left with some writing in
10 it, and then there is a pictogram on the right.

11 With respect to the pictogram on the
12 right, can you tell me what you recognize that
13 to be?

14 A. This is what Ganu is referring to as the "Beacon
15 and Association Message Format."

16 Q. Let me make sure I understood you. You said the
17 beacon -- I'm sorry, could you repeat that? I'm
18 not sure I heard you, Dr. Haas.

19 A. Sure. It's the diagram on the right of figure 4
20 is "Beacon and Association Message Format."

21 Q. Okay. And is this -- is this message a message
22 that's packaged for any particular -- how to say
23 it? -- layer of Ganu that is described in column
24 883, Software Architecture and Implementation?

1 MR. BELNAP: Objection, form.

2 A. So as in the left column of Page 882 Ganu says
3 "In SOHAN, FNs and APs periodically send beacons
4 while the" mobile nodes "scan different
5 channels, listen to the beacons and send an
6 association message to the best 'cost' parent
7 using the discovery metric described below."

8 So those are beacons which are generated
9 by the forwarding nodes and the access points,
10 and those beacons are being received and used by
11 the mobile nodes, at least for the function of
12 being able to associate with a node based on the
13 best cost. And, again, the cost is being
14 determined by the discovery metric which is
15 described below.

16 Q. Do you view this to be an 802.11 beacon?

17 MR. BELNAP: Objection, form.

18 A. I view it as a modification of the 802.11
19 beacon, and indeed -- and indeed Ganu clearly
20 states this above, "We use augmented 802.11" --
21 this is in the middle of the left column on Page
22 882. It says, "Based on these results, we use
23 augmented 802.11 MAC beacons and associations in
24 SOHAN to support neighbor discovery and

1 determination of the logical topology."

2 Q. Okay. And what in the diagram on the right side
3 of figure 4 indicates to you any augmentation of
4 an 802.11 MAC beacon?

5 MR. BELNAP: Objection, form.

6 A. At least the appended -- the fields which are
7 emphasized here in the format of the message
8 which is transmit power and the receive power
9 are being added is to the 802.11 MAC beacon
10 structure -- format.

11 Q. Is there anything else?

12 MR. BELNAP: Objection, form.

13 A. Well, I have not analyzed all the different
14 fields here, sir.

15 For the purpose of my analysis, the
16 addition of those two fields that I just
17 discussed is what I use as a feature to borrow
18 from Ganu into the system of Cromer.

19 Q. And if we could look at figure 6 briefly.

20 A. Of Ganu, sir?

21 Q. Figure 6 of Ganu on Page 883, correct.

22 A. Yes, sir.

23 Q. So there is a picture of an example of an AP, a
24 picture of an example of an FN, and a picture of

1 an example of an MN.

2 A. I see those elements that you mention.

3 Q. Does the AP appear to be a PC of some kind?

4 MR. BELNAP: Objection, form.

5 A. To be more precise, the AP are based on the US
6 Robotics 2450 Access Points.

7 Q. Do you have any idea what Ganu is depicting
8 there in the picture above "AP" in figure 6?

9 A. It depicts a system which serves as the access
10 point and is based on the US Robotics Access
11 Points which is customized -- which has
12 customized code.

13 Q. And is the FN some kind of router as shown in
14 figure 6?

15 MR. BELNAP: Objection, form.

16 A. Again, it's written in column left, "The FNs
17 were built on Compulab 586 CORE platform running
18 a 133" megahertz "processor with two PCMCIA"
19 cards -- I'm sorry, "two PCMCIA slots for two
20 wireless interfaces."

21 Q. So do you recognize the physical form of that
22 piece of hardware shown in figure 6 as FN,
23 beyond what is described in Ganu?

24 MR. BELNAP: Objection, form.

1 A. I'm really not sure, sir, what you're asking me.
2 Do I look at the picture in the photo there and
3 I recognize that this is Compulab 586 CORE
4 platform? Is this what you're asking me?

5 Q. Yes.

6 A. I don't know how Compulab 586 CORE platform
7 looks like, sir, so I couldn't say one way or
8 another, but I trust Ganu represents the figure
9 of what he claims it is. At least I have no
10 reason to believe that this is a fake figure,
11 sir.

12 Q. Fair enough.

13 A. I just want to mention, if you will allow me to
14 emphasize, again, and Ganu talks about it over
15 and over and over again, that what he presents
16 in this particular paper is a prototype, a
17 proof-of-concept prototype which is not a
18 product or any kind of, say, system that you
19 would propose to sell to customers, so to speak.
20 It's a proof-of-concept prototype that he
21 presents, and the results he presents related to
22 this proof-of-concept prototype, sir.

23 Q. What do you mean by "proof-of-concept
24 prototype"?

1 A. What I mean, sir, if you will allow me, let's go
2 to -- let's go to the first column, which is --
3 I'm sorry, the first page, Page 880, the first
4 sentence in the abstract says, "This paper
5 describes the design and implementation of a
6 novel 802.11-based self-organizing hierarchical
7 ad-hoc wireless network (SOHAN), and presents
8 some initial experimental results obtained from
9 a proof-of-concept prototype."

10 In the key words it talks about "system
11 prototyping."

12 Then we go to the right column -- well,
13 the end of the left column, "we focus on
14 practical design aspects and prototype
15 implementation of protocols used in the SOHAN
16 ad-hoc network."

17 Then again in the first paragraph in the
18 right column, it talks about "Design
19 trade-offs," and so on, "for both discovery and
20 routing are discussed, and a proof-of-concept
21 prototype (implemented on Linux platforms with
22 802.11b radios) is described."

23 The last sentence in this paragraph
24 talks about "also given for the prototype

1 hierarchical ad-hoc network."

2 Then I'm trying to find other references
3 here. So, for example, on Page 881 on the right
4 column under the section "Ad-Hoc Network
5 Protocols for SOHAN," the first sentence says,
6 "The above results motivated the design and
7 development of a proof-of-concept prototype for
8 the proposed self-organizing hierarchical ad-hoc
9 network (SOHAN)."

10 Then again on Page 882, it talks
11 about -- in the middle here, the sentence "Note
12 also that for ease of implementation the"
13 bacon -- I'm sorry -- "the beacons used in the
14 prototype are application-level packets," and so
15 on.

16 Then again on the same Page 882, on the
17 right column there's another section, it talks
18 about Prototype Implementation of SOHAN." The
19 first sentence talks about, "In this section,
20 the practical design aspects and implementation
21 of a proof-of-concept prototype for SOHAN" --

22 Q. And -- I'm sorry, go ahead.

23 A. On Page 883 under "Experimental Results," it
24 talks about, again, "The experimental nodes ran

1 Linux," and so on.

2 Okay. I'm going to the discussion, in
3 884, in the right column, "Conclusions and
4 Future Work," "A proof-of-concept prototype was
5 developed for evaluation of prototype design
6 options," and so on.

7 So it is clear, this whole paper
8 discusses proof of concept. Now, in research --
9 and the POSITA would have understood that this
10 paper comes from a research environment, of
11 course. We often have, you know, improvements,
12 ideas, that's one, and we want to demonstrate
13 them relatively fast, so to speak, so we use
14 proof-of-concept demonstrations and prototype.
15 Those proof of concept show, for example,
16 whether a particular protocol would work or
17 whether -- it allows us to evaluate certain
18 features of the protocol. But this doesn't mean
19 that this implementation or proof of concept is
20 implementation that should be carried out as a
21 final product. The ideas is what matters here
22 in the protocol, and the implementation is just
23 proof of concept: Simple, fast demonstration of
24 the idea.

1 Q. And Ganu teaches in part that actual network
2 adapters of the time were not customizable,
3 right?

4 MR. BELNAP: Objection, form.

5 A. Ganu says indeed that 802.11 adapters, network
6 adapters were not -- cannot be customized.

7 MR. COGSWELL: We've been going for
8 about another hour. Let's go off the record.

9 (Discussion off the record.)

10 THE WITNESS: Let me sort of finish this
11 answer, if you will allow me, sir. Is okay,
12 sir?

13 MR. BELNAP: Finish your answer.

14 Q. Yeah, finish your answer.

15 A. What I mean it cannot be customized, I mean it
16 cannot be practically customized, that's what I
17 meant. So it says 802.11 adapters are not
18 customizable. What he means of course is it
19 cannot be practically customized in an easy way,
20 so to speak. Okay?

21 MR. COGSWELL: Fair enough. Let's go
22 off the record.

23 (Recess.)

24 MR. COGSWELL: Welcome back, Dr. Haas.

1 A. Thank you, sir.

2 If you would just allow me, we sort of a
3 little bit abruptly finished before, so if you
4 would allow me to add one more sentence to my
5 previous reply? Is this okay, sir?

6 Q. Yes.

7 A. So I want to point out, as we discussed, even
8 though Ganu says that the 802.11b network
9 adapters are not customizable, he clearly says
10 that his system, in terms of modification, at
11 least, the adapter could be implemented in a
12 802.11b adapter, it's just that he didn't do it
13 because it's easier to do it at a different
14 level for his proof of concept system.

15 But he clearly states here on Page 884
16 in the left column, somewhere in the middle,
17 "However, using firmware-generated beacons
18 should solve this problem."

19 So he clearly says, "Yeah, you can do it
20 on the firmware level. I didn't do it on the
21 firmware level, so to speak" -- you know,
22 putting quotes in Ganu's mouth -- "so to speak,
23 because I was just building proof of concept,
24 but it doesn't mean that, you know, if you want

1 to create a product out of this, you should not
2 be able to do it at the firmware level."

3 That's the additions that I wanted to
4 make, sir. Thank you for allowing me to make
5 the clarification, sir.

6 Q. Okay. So if I understand you, you're saying
7 that he provided a proof of concept, but did not
8 implement in a firmware level; is that correct?

9 A. Yeah, he didn't do the product that he can sell,
10 but he proved that this protocol, his protocol
11 and his system architecture is feasible and was
12 able to evaluate that this was a prototype, its
13 performance, but he did not manufacture the
14 product to be sold, so to speak, in the market
15 because this was unnecessary for his purpose, to
16 manufacture a product. He only wants to provide
17 proof of concept of the product -- the form of
18 the product.

19 Q. So he didn't evaluate whether or not it would be
20 possible to make such a product, did he?

21 MR. BELNAP: Objection, form.

22 A. No. He says it would be possible. He says,
23 "However, using firmware-generated beacons
24 should solve this problem."

1 He says, "Definitely a POSITA could do
2 it. It's just I wanted to do it fast, just to
3 provide proof of concept."

4 But, again, he clearly states here,
5 "yeah, I can do it in firmware, and be done."
6 And he clearly, I mean, again, talks also
7 further about actual improvements and so on and
8 so on.

9 Clearly he says everything I propose
10 here, Ganu proposes here is feasible to do.

11 In terms of implementation, "I did it in
12 a prototype mode, fast. If you want to create a
13 product, you do it at the firmware."

14 Q. Well, in fact, he recognizes that existing
15 802.11b network adapters were not customizable,
16 right?

17 A. Right.

18 MR. BELNAP: Objection, form.

19 A. He says that if you buy a product, which is
20 802.11b network adapter, if you buy the product,
21 you don't get to play with the firmware, but if
22 you want to build your own product, sure, you
23 can do it. He says here, "firmware-generated
24 beacons should solve this problem." Beacons

1 should solve this problem.

2 But if you send me a black box which I
3 cannot program, I cannot program it, period.
4 But, you know, if I built my own firmware,
5 should be able to implement this in the
6 firmware. But he clearly supports -- he clearly
7 states this here.

8 Q. Let's skip to paragraph 133 of your declaration,
9 then.

10 A. Paragraph 133. Yes, sir, I am here.

11 Q. One minute, please, Dr. Haas.

12 A. Sure.

13 Q. Thank you. I'd like to turn to paragraph 148 of
14 your declaration, please.

15 A. 148, sir. I am at 148, sir.

16 Q. Is it fair to say that your opinion is that
17 Cromer modified by Ganu meets the
18 network-enabled hub and data forwarding logic
19 limitations for the reason that you gave for the
20 claim 1 preamble?

21 MR. BELNAP: Objection, form.

22 A. That's not exactly what I say here, sir, I
23 believe. What I say here in paragraph 147,
24 "Cromer, at least in combination with Ganu,

1 taught this element."

2 Then I say that, as discussed in 1
3 preamble, "Cromer as modified by Ganu, taught a
4 client device 100 (network-enabled hub) that
5 would organize as a forwarding node (FN)
6 following Ganu's FN teachings. See [1pre]."

7 But then I have explanation exactly why
8 and how this element is being disclosed in
9 Cromer, at least in combination with Ganu.

10 Q. Okay. And where in your declaration do you
11 continue with that discussion?

12 A. So, for example, 149. "For example, a POSA
13 would have understood that Cromer's processor
14 770, in conjunction with software stack 200
15 [sic] was configured, when modified by Ganu's
16 data forwarding, to implement Ganu's data
17 forwarding logic because processor 770, wireless
18 interface 710," and so on and so on, all
19 controlled -- "controlled all of the wireless
20 data operations and connections of client device
21 100."

22 Then -- I mean, I don't want to just
23 read from here, but all this is here. It's the
24 implementation, client device 100, user

1 processors, and so on. And then as modified by
2 Ganu data forwarding -- by Ganu's data
3 forwarding, Cromer's processor 770 would further
4 use hardware and software to implement the data
5 forwarding logic, including memory, software,
6 wireless, transceiver and so on.

7 And then I also discuss the other
8 analysis in case the board finds that this
9 particular limitation is governed by what's
10 called means plus function, in which case I
11 provide here analysis why this means plus
12 function interpretation of this, of this
13 limitation is also met.

14 Q. So is it -- so looking at your declaration, is
15 it fair to say it's your opinion that a
16 hypothetical combination of Cromer and Ganu
17 would include modifying Cromer's software stack,
18 which is element 200?

19 MR. BELNAP: Objection, form.

20 A. So to answer your question, the proposed
21 combination of Cromer with Ganu as proposed in
22 my declaration would require some software
23 modification to the client 100 that would
24 perform the forwarding operation which was

1 proposed by Ganu.

2 Q. Okay. And so how is that --

3 A. I'm sorry. At least this. It may require other
4 changes as well, but at least to accommodate the
5 forwarding operation.

6 Q. Okay. So Cromer's software stack includes an ad
7 hoc-driver element 140, right?

8 A. Software stack includes element 140 ad-hoc
9 driver.

10 When I said that some modification to
11 the forwarding operation would be required, that
12 some modification to the software -- software
13 code, so to speak, of Cromer client 100 would be
14 necessary, I didn't refer to a particular
15 element, I just said in general, some software
16 modification would be required to accommodate
17 the forwarding feature of Ganu.

18 Q. What I'm noting in your declaration at paragraph
19 149, Dr. Haas, you make reference to "this
20 implementation in client device 100... used
21 software stack 200."

22 Do you see that?

23 A. It says, "This implementation in client device
24 100 used processor 770, wireless interface 710,

1 and software stack 200." Is this what you mean?

2 Q. Yes.

3 A. Okay.

4 Q. Cromer's software stack 200 includes both an
5 ad-hoc driver 140 and an infrastructure driver
6 120, right?

7 A. The software stack of Cromer 20 includes ad-hoc
8 driver 140 and infrastructure driver 120, sir.

9 Q. Okay. Is it fair to say in your hypothetical
10 combination of Cromer and Ganu, this would
11 involve modifying Ganu's ad-hoc driver 140?

12 MR. BELNAP: Objection, form.

13 Q. Do you understand the question I'm asking, Dr.
14 Haas?

15 A. I understood the questions that you are asking,
16 I'm just not exactly sure where do you see it
17 from written in my declaration? I don't think
18 this is what I wrote in my declaration.

19 Q. So what is the -- I apologize, I'm switching
20 between two papers here.

21 So do you have an understanding of how
22 in your hypothetical combination Cromer's
23 software stack 200 would be modified beyond what
24 you've put in your declaration?

1 A. I've not opined on, but there are changes that
2 need to be made to the code of client 100 in
3 general and to the software stack 200 in
4 particular. But this is something, what changes
5 and where changes need to be made to the code,
6 that's something that I have not opined on in my
7 declaration and therefore I would need to give
8 it some thought exactly what needs to be done,
9 what code changes need to be incorporated to
10 implement Ganu's features that I used such as
11 the forward.

12 I just want to mention, in general, as I
13 sit here, I do not believe that drivers
14 themselves would need to be modified, but I --
15 as I mentioned, to be on the safe side, I
16 probably need time to analyze it if you asked me
17 specifically what code needs to be touched, so
18 to speak, to accommodate the forwarding
19 operation.

20 Q. Okay. Thank you, Dr. Haas.

21 MR. COGSWELL: Okay. Let's go off the
22 record for a minute.

23 (Discussion off the record.)

24 (Recess.)

1 MR. COGSWELL: Are you all ready?

2 THE WITNESS: I'm ready, sir.

3 MR. COGSWELL: Okay. Thank you.

4 Q. I had a couple of follow-up questions about
5 Ganu.

6 A. I'm sorry, could you repeat this? A couple of
7 what?

8 Q. I had a couple of follow-up questions about
9 Ganu.

10 A. Sure. Yes, sir. Yes, sir.

11 Q. We were talking earlier about figure 5. Do you
12 recall that?

13 A. Yes, sir. Figure 5 of Ganu. Yes, sir.

14 Q. In the center of the figure there is this stack
15 with "Packet handling" on the bottom and
16 "Application" on the top.

17 Do you see that?

18 A. I see it, sir.

19 Q. Is that -- does that stack correspond to
20 processes occurring inside a forwarding node of
21 Ganu?

22 MR. BELNAP: Objection, form.

23 A. The protocol stacks on both sides of figure 5
24 are the layers. What's in the middle draw

1 correspondence to particular functionalities of
2 those layers.

3 What you see on the left again and on
4 the right are the protocol stacks of sensor.c,
5 which is the implementation of the sensors; the
6 forwardnode.c, which is the implementation of
7 the forwarding node; and ap.c, which is the
8 implementation of the access point.

9 I hope this answers your question.

10 Q. Okay. Thank you. I think it gets at it.

11 And what is the relationship between the
12 stack in the center of figure 5 and the stacks
13 on either side of figure 5?

14 A. So I just mentioned it. The functions in the
15 middle are rough functionalities of the
16 different layers on both sides.

17 Q. I understand. Thank you, Doctor.

18 A. So if you -- if you just read what's written
19 here, right, you can see, example, there's
20 application layer, in the center you have
21 sensor.c, forwardnode.c, and ap.c. And you see
22 this application in the middle. Then you see on
23 both sides, ap, fn, and sensor.c. right?
24 That's pretty clear.

1 Q. Thank you. Next --

2 A. If you will allow me, I apologize. I want to --
3 you know, I apologize for repeating this over
4 and over again. I just want to make sure that
5 there's no misunderstanding.

6 I do not hold implementation of Ganu
7 into my combination. So how Ganu implements his
8 prototype or his proof-of-concept prototype is
9 not how I would implement it in my combination.

10 What I import from Ganu are particular
11 features, if you wish, that Cromer has -- would
12 benefit from in using in his system. How
13 Cromer -- how those features would be
14 implemented in the combined system of Cromer and
15 Ganu is not necessarily reflected how Ganu
16 implemented it in this prototype,
17 proof-of-concept prototype, sir.

18 Q. Okay. So speaking of Ganu's implementation,
19 which includes MNs, FNs and access points, what
20 would happen in Ganu hypothetically if you
21 removed the access points?

22 A. I am not exactly sure. That's a very
23 hypothetical question. Why would you want to
24 remove access point, for what reason, from this

1 architecture? I'm not exactly sure.

2 Q. So if -- let's just assume -- yes, it's a
3 hypothetical. But let's assume, based on your
4 understanding of Ganu, that for some reason you
5 wanted to remove the access points. What would
6 the consequence be for the operation of Ganu's
7 system?

8 MR. BELNAP: Objection, form.

9 A. You know, again, I typically don't like to
10 answer hypothetical questions because clearly it
11 depends very much on a lot of assumptions and so
12 on.

13 But let's assume you are taking the
14 proof of concept, Ganu's system, okay, and of
15 course as Ganu says the APs are connected to
16 electric outlet. It says it on Page 881. If
17 there's power failure, okay, for example, okay,
18 and it's FN nodes, the FN nodes also connected
19 to the electric outlet. So Ganu says in the
20 middle here, FN is typically compact radio
21 device that can be plugged into an electric
22 outlet but in certain scenarios may also be a
23 battery-powered mobile device.

24 Let's assume the FN is also connected to

1 a power outlet. Okay?

2 Well, I mean, the system will not work
3 because, hey, you don't have power. Right?
4 What happens if you're, you know, if you're --
5 if your house loses power, you clearly don't
6 have any electricity, right, so things don't
7 work. Right? Okay.

8 If the -- on the other hand, if the FN
9 were to be battery powered, I believe -- again,
10 it very much depends on the permutations of
11 this. There's a lot of assumptions behind here.
12 That's why I don't like to answer hypothetical
13 questions. But presumably the communication
14 between mobile node, one mobile node to another
15 mobile node would still work. The communication
16 between the mobile node through the Internet
17 would not work because the AP is disconnected.
18 Right? No power. Okay?

19 So I don't know if it's an answer to
20 your question, but clearly such a hypothetical
21 question, you know, it very much depends on what
22 assumptions are; and it's very, very difficult
23 to answer in vacuum.

24 So I gave you some answer, you know, but

1 please understand that this is under some very
2 far-going assumptions and so on.

3 MR. COGSWELL: Thank you, Dr. Haas. I
4 appreciate your time today. I have no further
5 questions.

6 THE WITNESS: It has been my pleasure,
7 sir.

8 MR. BELNAP: I don't have anything.

9 (Whereupon, at 4:00 p.m., the
10 proceedings were adjourned.)

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1 COMMONWEALTH OF MASSACHUSETTS

2 COUNTY OF SUFFOLK

3
4 I, Loretta Hennessey, Registered
5 Diplomat Reporter and Notary Public in and for
6 the Commonwealth of Massachusetts, do hereby
7 certify that ZYGMUNT J. HAAS, the witness whose
8 testimony is hereinbefore set forth, came before
9 me via videoconference on the 8th day of September,
10 2023 from 10:07 am to 4:00 pm and was by me duly
11 sworn, and that his examination reduced to
12 typewriting under my direction; and that the
13 transcript is a true record of the testimony given
14 by the witness to the best of my knowledge, skill
15 and ability and that the deposition was taken in
16 the presence of counsel for Unified Patents and Ozmo
17 Licensing.

18 I further certify that I am neither
19 attorney for nor related to or employed by any of
20 the parties to the action in which this deposition
21 is taken; and further that I am not a relative or
22 employee of any attorney or counsel employed by
23 the parties hereto or financially interested in
24 the action.

IN WITNESS WHEREOF, I have hereunto set my hand
this 11th day of September, 2023.

Loretta Hennessey
S/Loretta Hennessey

SIGNATURE PAGE/ERRATA SHEET

[illegible]

Signed under the pains and penalties of perjury.

DATE _____

Deponent, ZYGMUNT J. HAAS

NOTARY: If Requested:

On this _____ day of _____, 20__, before me, the undersigned notary public, personally appeared ZYGMUNT J. HAAS, who presented satisfactory evidence of identification, to wit, _____, and signed this document in my presence.

Notary Public in and for

My commission expires_____

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