

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

NETFLIX, INC.,)
)
Petitioner,)
)
vs.) Case No.
) IPR2018-01187
REALTIME ADAPTIVE STREAMING, LLC,) IPR2018-01630
) US Patent No.
Patent Owner.) 9,769,477
_____)

DEPOSITION OF KENNETH A. ZEGER, Ph.D.
JULY 17, 2019
SAN DIEGO, CALIFORNIA

Reported by:

Cynthia J. Vega, RMR, RDR, CSR 6640, CCRR 95

Job No. 162536

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July 17, 2019
9:08 a.m.

The deposition of Kenneth A. Zeger, Ph.D., a
Witness herein, taken on behalf of Petitioner, held at
12275 El Camino Real, Suite 200, in the City of
San Diego, County of San Diego, State of California,
before Cynthia J. Vega, Certified Shorthand Reporter
6640, Registered Merit Reporter, Registered Diplomat
Reporter, California Certified Realtime Reporter 95.

APPEARANCES

For the Petitioner:

SHEPPARD MULLIN RICHTER & HAMPTON

BY: CHRIS PONDER

HARPER BATTS

379 Lytton Avenue

Palo Alto, California 94301

For the Patent Owner:

NOROOZI

BY: JOEL STONEDALE (Present via teleconference)

11601 Wilshire Boulevard

Los Angeles, California 90025

Also in Attendance:

FRED CHUNG

* * * * *

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WITNESS

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(Exhibits previously marked and
referenced: 1001, 1005, 2002A, 2002B.)

1 SAN DIEGO, CALIFORNIA

2 WEDNESDAY, JULY 17, 2019, 9:08 A.M.

3
4 KENNETH A. ZEGER, PhD,

5 Witness herein, being first duly sworn, testifies as
6 follows:

7
8 EXAMINATION

9 BY MR. PONDER:

10 Q. Good morning, Dr. Zeger.

11 A. Good morning.

12 Q. So do you understand that you're here to give
13 deposition testimony regarding US Patent
14 Number 9,769,477?

15 A. Yes.

16 Q. And today's deposition will cover your opinions
17 stated in two separate declarations that you provided in
18 IPR2018-01630 and IPR2018-01187; is that correct?

19 A. I believe so. Yes.

20 Q. Dr. Zeger, I believe we've met at depositions
21 several times. Is it fair to say you're familiar with
22 the deposition process?

23 A. Yes.

24 Q. Okay. How about I just go ahead and go over a
25 few of the basic ground rules just as a refresher?

1 A. Okay.

2 Q. As you can see today, we have a court reporter
3 who's taking down the questions and your answers. So
4 I'd ask that we each make sure we pause before we start
5 speaking to avoid speaking over each other. Is that
6 okay with you?

7 A. Okay. I may add some additional pause just
8 because we have this link with Joel over the video which
9 may slow things down a little bit.

10 Q. Great. Okay. And in the course of asking
11 questions today, if any of my questions are unclear,
12 vague, or you have difficulty following, will you please
13 let me know to either reask the question or explain my
14 question better?

15 A. Yes.

16 Q. Is there any reason that you're not able to
17 give accurate and truthful testimony today on the
18 subject matter of your declarations?

19 A. No.

20 Q. What did you do to prepare for today's
21 deposition?

22 A. You mean in the short term, like last few days,
23 or just over a period of months or years?

24 Q. Let's say in the last month.

25 A. In the last month, I read the materials that

1 were pertinent for today's deposition and just reviewed
2 my declaration, various prior arts, and the other
3 materials that I needed to look at. And I also had
4 conversations with an attorney.

5 Q. And who was the attorney that you spoke with?

6 A. Mr. Joel Stonedale, who is being linked in by
7 video right now.

8 Q. I'm handing what was filed as Exhibit 2002 in
9 IPR ending in 1187.

10 A. Does this have an exhibit number?

11 Q. Yeah. I don't think the --

12 Joel, I just handed the witness what we're
13 downloading as Exhibit 2002, but the exhibit numbers
14 aren't printing on the PDFs.

15 A. I can write with my pen if that's okay.

16 Q. Okay. That's fine.

17 A. 2002?

18 Q. Yes.

19 MR. STONEDALE: I've got that here.

20 BY MR. PONDER:

21 Q. I'm also handing you what has been filed as
22 Exhibit 2002. They're both 2002. They're two separate
23 proceeding numbers, so your declaration, there is an
24 Exhibit 2002 ending 1630, and Exhibit 2002 in the other
25 IPR.

1 A. You don't want to do them A and B?

2 Q. The numbers are the numbers.

3 A. All right. So just if I refer to it, I should
4 mention like which proceeding it is with the number?

5 Q. Yes. I'll try to work off of perhaps the 1630
6 version.

7 A. Okay.

8 Q. Let's make sure that if we're referring to a
9 specific one that we put that in the record so it's
10 clear.

11 MR. STONEDALE: Would it be easier to call
12 one of them A and one of them B, instead of referring to
13 both of them as the longer IPR number?

14 MR. PONDER: Yeah. I think that will be fine.

15 MR. STONEDALE: Just a suggestion.

16 BY MR. PONDER:

17 Q. Let's go ahead and just for the purposes of
18 referring to these declarations, let's say that the
19 Exhibit 2002 filed in the 1630 proceeding is going to be
20 the A declaration.

21 A. And the other one is B.

22 Q. The other one will be B.

23 I think you mentioned you've -- have you
24 reviewed your declarations in preparation for today's
25 deposition?

1 A. Yes.

2 Q. Did you notice any errors or corrections that
3 need to be made to the declarations?

4 A. I might have seen one or two small typos. Do
5 you want me to try to find them?

6 Q. Are there any errors that you think are
7 significant other than, say, a typographical that's
8 clear from its context?

9 A. Not that I saw. I think anything I saw was
10 clear that was a typo.

11 Q. How much time did you spend preparing for
12 today's deposition in the past month?

13 A. I don't know exactly, but I would say on the
14 order of tens of hours.

15 Q. How much time have you spent reading and
16 reviewing the '477 patent?

17 A. Are you referring to the last month again?

18 Q. In the last month.

19 A. Again, it's difficult to give an exact number,
20 but I would say more than ten hours.

21 Q. How much time have you spent reading or
22 reviewing the '477 patent in connection with your work
23 for Realtime on these two IPRs?

24 A. So you're asking the same question, but
25 extending beyond the month?

1 Q. Yes.

2 A. Again, it's difficult to know exactly, but I
3 would say an additional amount of time, which was maybe
4 again several or tens of hours more.

5 Q. Do you believe you have an adequate
6 understanding of the '477 patent?

7 A. Well, for the purposes of these IPRs, I
8 certainly do.

9 Q. Is there anything about the '477 patent that
10 you think is unclear?

11 A. Nothing that I can think of right now. Maybe
12 if you point something out, I might have a different
13 opinion.

14 Q. Do you remember giving opinions relating to the
15 term "configured to"?

16 A. Are you referring to my declaration?

17 Q. In your declarations for this IPR.

18 A. Yes, I do.

19 Q. Okay. Do you remember providing your opinion
20 as to what "configured to" means?

21 A. I remember writing it. I know it's in my
22 declarations.

23 Q. Let's turn to paragraph 38 of the
24 Exhibit 2002 A.

25 A. 38, you said?

1 Q. Around 38.

2 A. I'm there.

3 Q. Okay. And is in paragraph 38 and 39 your
4 opinion as to the meaning of "configured to" as the term
5 is used in the '477 patent?

6 A. Paragraphs 38 and 39 certainly relate to the
7 phrase "configured to," which is claim language.

8 Q. You state, "a POSITA would understand the
9 claim's recitation of 'configured' to require that the
10 'first encoder' must compress at a higher rate than the
11 'second encoder' because it is designed to do so"; is
12 that correct?

13 A. I think you read a portion of paragraph 38
14 correctly.

15 Q. Okay. And then in the next paragraph you state
16 that "The '477 patent specification supports that
17 understanding, as it uses 'configured to' to convey a
18 purposeful design as opposed to a side effect or
19 accidental arrangement"; is that correct?

20 A. You read that correctly.

21 Q. What is the basis for your opinion on the
22 meaning of "configured to"?

23 A. Well, my basis is, number one, what the plain,
24 ordinary meaning of the phrase "configured to" would be
25 to a person of ordinary skill in the art at the time of

1 the invention. And also the specification supports that
2 meaning is consistent with it, so it is explained in my
3 declaration.

4 Q. Are you basing your opinion on some sort of
5 legal definition of "configured"?

6 A. No. My opinion is -- I'm not a lawyer, so I'm
7 not offering a legal opinion. I'm basing it on a
8 technical consideration how a -- from my experience
9 working with engineers for three decades, people that
10 are of ordinary skill in the art in patents, what they
11 would understand "configured to" to mean as it's written
12 in the claim of these -- of this patent in the context
13 of the patent.

14 Q. Is "configured" a word that a person of
15 ordinary skill in the art would have used in this field?

16 A. I think the phrase "configured to" is a fairly
17 common term that appears in engineering quite a bit. It
18 may be in slightly different context sometimes, but it
19 may also be in this context. And it's a term that's not
20 a rare term to use. I see it quite a bit, first of all,
21 in other patents and also in technical papers and
22 presentations in universities and companies, things like
23 that.

24 Q. Does "configured" have a -- sorry. Strike
25 that.

1 Does "configured to" have a specialized meaning
2 in the field of art that the '477 patent is within?

3 A. I would say it has a specialized meaning. I
4 think the meaning as written in the claim or claims of
5 this patent are clear in their ordinary -- plain and
6 ordinary meaning in the context of patent, but I don't
7 think there is any special meaning that would differ
8 outside of the plain, ordinary meaning.

9 Q. Are there any other words that could be used in
10 place of "configured to" that would have a similar
11 meaning?

12 A. That's not something that I considered.
13 That's -- my understanding is that would be an issue
14 that the attorney who drafted the patent or the patent
15 agent that drafted the patent would think about. I've
16 never drafted patents. I'm not an attorney. So I don't
17 know if there is a word that's legally equivalent to it
18 or even technically equivalent to it. I would have to
19 think about that. But I think the choice that was used
20 is a good word, it's very clear, and a person of
21 ordinary skill would understand it.

22 Q. How would this, the meaning of the claim change
23 if instead of "configured to," the claim recited
24 "capable of"?

25 Let me reask it. Strike that one.

1 How would the meaning of this claim change if
2 instead of "configured to," the claim recited "capable
3 of"?

4 A. Well, first of all, that's not what's recited,
5 so you're asking me a hypothetical which I didn't
6 consider. I didn't offer an opinion about that. So,
7 you know, I'd have to think about that. But offhand I'm
8 not sure if "capable of" has the same notion of intent
9 that "configured to" has.

10 So without really thinking much about it, my
11 initial reaction would be there might be a difference
12 there due to lack of an intent in the "capable of"
13 phrasing. But again, I'm not a patent attorney, so I
14 don't know if there is some legal nuance there. I'd
15 really have to think about that more.

16 Q. So it's your position that the phrase "designed
17 to" implies a requirement that there be some sort of
18 intent to bring about some occurrence?

19 A. I think your question just used the phrase
20 "designed to" and previously you mentioned "configured
21 to." Is that what you really wanted to ask me?

22 Q. Let me reask that. Is it your position that
23 the phrase "configured to" implies some sort of intent?

24 A. If you look at my paragraph 39 here, I say that
25 "The '477 patent's specification supports that

1 understanding, as it uses 'configured to' to convey a
2 purposeful design as opposed to a side effect or
3 accidental arrangement." So I think that's answering
4 the question.

5 Q. Is there a difference between a side effect or
6 an accidental arrangement?

7 A. I think there could be a difference, yes.

8 Q. Is there -- I guess I'm trying to understand.
9 Why did you identify a side effect or accidental
10 arrangement? Did you mean to convey the same concept or
11 are you trying to describe two different concepts by
12 having two separate terms?

13 A. Well, I think these are examples. I think they
14 have some overlap. They're not necessarily disjoint
15 concepts. Some side effects might be due to accidental
16 arrangements, but I think they both convey the idea that
17 a particular aspect could arise by -- without intent or
18 without the -- without it basically being an intentional
19 thing that arose. And that's in contrast to "configure
20 to" where the aspect you're considering is due to an
21 intentional purpose.

22 Q. Would the phrase "adapted to" serve the same
23 purpose as "configured to" in this claim?

24 A. Again, as in the question when you ask me about
25 "capable of," now you're asking me about "adapted to," I

1 didn't offer any opinion about that and I didn't
2 consider that. That didn't arise anywhere in the
3 petition. So that's a hypothetical that I really didn't
4 give an opinion about.

5 I'm not sure if there is some legal meaning to
6 the phrase "adapted to" and I don't know, you know,
7 offhand without thinking about it whether it is exactly
8 equivalent to "configured to" or not. I do know
9 "configured to" means to have intent. Whether or not
10 "adapted to" has intent, that's something I would have
11 to think about.

12 Q. Do you think "adapted to" -- strike that.

13 How do you think "configured to" is different
14 from "capable of"?

15 A. I think that was conveyed in part in my answer
16 a few questions ago when you asked about "capable of."
17 I didn't perform an exact analysis as to the
18 similarities and differences of the phrase "configured
19 to" and "adapted to" -- I'm sorry. You said "capable
20 of." But like I said offhand, it feels like "capable
21 of" might not have the intent aspect to it that
22 "configured to" does, so that might be one difference as
23 an example.

24 Q. Do you know whether there is a legal meaning to
25 the phrase "configured to"?

1 A. Well, I'm not an attorney, but I've heard of
2 some legal discussion about it in a case, but I can't
3 offer an opinion about that.

4 Q. What legal discussion have you heard concerning
5 the meaning of "configured to"?

6 A. I think the case was called Apex.

7 Q. And how did you come across the Apex case?

8 A. I think an attorney at one point explained it
9 to me and just so I'd have some understanding.

10 MR. STONEDALE: I'll caution the witness not to
11 reveal anything privileged.

12 BY MR. PONDER:

13 Q. Do you think that case might have been the
14 Aspex Eyewear versus Marchon Eyewear case that's cited
15 in the patent and response?

16 A. That sounds familiar to me, but I can't be
17 certain.

18 Q. Are you relying upon the legal explanation for
19 the meaning of "configured to" in forming your opinions?

20 A. Not at all. My opinions about "configured to"
21 are purely from a technical perspective as to what a
22 person of ordinary skill in the art would understand the
23 meaning, not an attorney. I'm not an attorney, so I
24 can't offer a legal opinion.

25 Q. So you've not formed any opinion as to whether

1 any legal meaning of "configured to" is consistent with
2 the technical meaning of "configured to" in the
3 '477 patent?

4 A. I don't know of any inconsistency, but I'm not
5 forming any opinion about any legal aspect of that
6 phrase at all.

7 Q. Can you provide any examples of how "configured
8 to" has been used in the field of art of the '477 patent
9 versus "designed to" or "capable of"?

10 A. You mean you want me to recite language where
11 it appears in some other patent? Is that what you're
12 asking?

13 Q. If you can give examples of how "configured
14 to," "designed to," or "capable of" could be used by a
15 person of ordinary skill in the art in this field of
16 invention.

17 A. I've read many, many patents and technical
18 papers in my life. I don't memorize the text of those.
19 I didn't prepare for that particular question for
20 today's proceedings because that was not one of the
21 opinions that I offered.

22 Q. Based upon all the patents and technical papers
23 that you've seen in your lifetime, have you ever seen an
24 instance where there has been a distinction made in this
25 art based upon differences in the words "configured to,"

1 "designed to," or "capable of"?

2 A. When you say a distinction in the art, are you
3 referring to a technical disclosure in a patent that
4 would compare and contrast two of those phrases like
5 "capable of" and "configured to" within the same
6 document?

7 Q. Not necessarily in the same document. Just any
8 time in your work in this field, have you ever seen
9 where it mattered there was some sort of distinction
10 made on the technical disclosure based upon the use of
11 these different phrases?

12 A. Well, from my experience, typically things like
13 patents and technical documents don't compare and
14 contrast different phraseology such as the ones you
15 mentioned, "configured to" and "capable of," within the
16 same document. They usually just choose one or the
17 other or neither and provide a statement. So I don't
18 think I've read a comparison type of document. Maybe
19 there is like a paper written by a law professor that
20 might have analyzed the theory of that, but I don't
21 recall ever seeing that.

22 Q. So from a technical perspective, you can't
23 think of any area in this art where differences between
24 "configured to," "capable of," or "adapted to" have been
25 a subject of importance?

1 MR. STONEDALE: Object to form.

2 THE WITNESS: Sorry, Joel. Could you repeat
3 it? It got muffled.

4 MR. STONEDALE: I just said object to form.
5 Go ahead and answer.

6 THE WITNESS: I can't recall if any technical
7 document that I've ever read that performed an analysis
8 comparing the two and where it said, "Here is some
9 differences of using one phrase. Here is differences of
10 using another phrase." Normally they just use one or
11 the other and you figure out what they mean from it.

12 BY MR. PONDER:

13 Q. To make sure I understand your testimony, are
14 you saying that "configured to" has a specific meaning
15 in this technical field, but you're not able to give an
16 example of how that language differ from other language
17 that could be used, such as "adapted to" or "capable
18 of"?

19 A. I think that mischaracterizes what my testimony
20 was.

21 Joel, sorry. You got muffled again. I
22 overtalked.

23 MR. STONEDALE: Object to form again.

24 Go ahead.

25 THE WITNESS: Okay. My testimony was not that

1 "configured to" had a special meaning in this field. I
2 actually testified to the opposite. I said that I think
3 there is a plain and ordinary meaning in the context of
4 this patent and the claims for which it appears, where
5 the phrase "configured to" appears.

6 And in the second part of your question that
7 began with the word "but" was that I cannot recall
8 reading any particular study, technical document, or
9 something of that form that compared and contrasted
10 "configured to" to alternative hypothetical words that
11 you've suggested.

12 BY MR. PONDER:

13 Q. Have you ever seen the words "adapted to,"
14 "capable of" -- strike that.

15 Have you ever seen the words "adapted to" or
16 "capable of" used in technical writings or disclosures
17 in this field of art?

18 A. Yes.

19 Q. Okay. So these words aren't hypothetical
20 technical terms; correct?

21 A. I'm not sure what it means for a term --

22 THE REPORTER: Excuse me, Mr. Stonedale.

23 MR. STONEDALE: Object to form. In fact, all
24 my objections will be to form. I believe they are the
25 only ones we can make.

1 THE WITNESS: I'm not sure what it means for a
2 technical term to be hypothetical, so maybe you can
3 clarify that, please.

4 BY MR. PONDER:

5 Q. I guess the correction is that you referred to
6 them as hypothetical words. So let me reask the
7 question.

8 Have you seen the words "adapted to" or
9 "capable of" used in this field of art?

10 A. I believe I have. I can't recall specifically
11 offhand where, but I'm sure I've seen them.

12 Q. So can you describe how "configured to" differs
13 from "capable to" in those technical writings or
14 disclosures in this field of the art?

15 A. You just asked the question with the phrase
16 "capable to." Did you mean "capable of"?

17 Q. Yes. Let me reask that.

18 Actually, I think I've lost my feed.

19 (Pause in proceedings.)

20 BY MR. PONDER:

21 Q. Have you seen the phrase "capable of" used in
22 this field of art?

23 A. I'm pretty sure that I have, but I can't recall
24 specifically where.

25 Q. Can you explain how "capable of" is used

1 differently than "configured to" in this art?

2 A. As I just mentioned --

3 MR. STONEDALE: Object to form.

4 THE WITNESS: As I just mentioned, I don't
5 recall specifically where I've seen the phrase "capable
6 of," but similar to an answer a while ago that I gave to
7 another question you had, I did not perform an analysis
8 about the specific similarities and differences of the
9 phrase "capable of" and "configured to."

10 But generally I think one difference might be
11 that "configured to" in the context of this patent and
12 the claims that it's in has the idea of intent to it or
13 purposeful design, whereas "capable of" might not have
14 that implication. There may be other differences or
15 similarities and I did not perform a complete analysis,
16 but that's partially what I can say.

17 BY MR. PONDER:

18 Q. And sitting here today, you can't point me to
19 an example of some document or writing that would show
20 this difference between "capable of" and "configured to"
21 with respect to this intent aspect?

22 A. Well, today I brought no documents with me
23 whatsoever. And the only documents I have in front of
24 me are my two declarations. I'm pretty sure I didn't
25 include that in my declarations. So I have no paper

1 documents I can point you to because I really don't have
2 any with me. Maybe if I had a computer, I could do a
3 search using Google, I might be able to come up with
4 something, but I don't have that available to me here.

5 Q. Okay. Let me ask you a couple questions about
6 some of the prior art references today. Are you
7 familiar with the Imai reference?

8 A. Could you spell that?

9 Q. Imai, I-m-a-i.

10 A. I'm sorry. I pronounce it Imai.

11 Q. Imai.

12 A. Yes, I am.

13 Q. Are you familiar with the Pauls reference?

14 A. Yes.

15 Q. You understand that my references today to Imai
16 and Pauls are the prior art references that you
17 discussed in your declarations?

18 A. Correct.

19 Q. Have you provided an opinion on the purpose of
20 the Imai reference?

21 A. Is there something you can point me to in my
22 document, in my declaration?

23 Q. I don't think you have. That's why I'm kind of
24 asking to see if you can point me to something.

25 A. I don't recall offhand whether the purpose of

1 the Imai document played a role in any of my opinions.
2 I don't actually think it did. I may be forgetting
3 something. Maybe with respect to motivation to combine,
4 there may have been an issue there. But if you can
5 point me to something, I could probably locate it
6 quicker.

7 Q. Okay. I'm not aware of a spot.

8 Let me ask you about the Pauls reference. Do
9 you think there is anything in your declaration where
10 you provide an analysis of the purpose of Imai? Let me
11 reask that.

12 Is there any portion of your declaration where
13 you provide an analysis of the purpose of Pauls?

14 A. I guess in my declaration -- I'm looking at the
15 Exhibit 2002, what we call A -- in the motivation to
16 combine section, so starting at my paragraph 137 on
17 page 39 through maybe paragraph 149, I'm discussing
18 various issues having to do with motivation to combine.
19 I don't think I explicitly state an actual purpose of
20 either one, but it may be in there implicitly in terms
21 of lack of motivation to combine. But I don't have an
22 actual statement saying the words, the purpose of Pauls
23 or Imai is dot dot dot.

24 Q. So in your analysis, you did not consider the
25 purpose of Pauls other than for the motivation to

1 combine?

2 MR. STONEDALE: Object to form.

3 THE WITNESS: I don't think that's accurate. I
4 consider the purpose of all the prior art in this case,
5 Imai and Pauls, in formulating all of my opinions, but
6 to the extent that it was necessary to form these
7 opinions -- so right now I'm not seeing where it played
8 a role, but I've got a lot of pages here in my
9 declaration. So it might have played a role in a
10 particular opinion. If you, you know, pointed to a
11 specific opinion and asked me about it, I could let you
12 know whether the purpose played a role in that opinion,
13 but I don't think I explicitly stated the purpose in my
14 declaration.

15 Q. Okay. So are you saying that you did consider
16 the purpose of Pauls in forming your opinions in this
17 declaration?

18 A. Yes.

19 Q. And in reviewing your declaration, you don't
20 see an express statement as to your opinion of the
21 purpose of Pauls?

22 A. I don't see it right now. Maybe I'm missing
23 it, but right now I can't spot it.

24 Q. Can you tell me what purpose you had in mind
25 for Pauls?

1 A. Well --

2 MR. STONEDALE: Object to form.

3 THE WITNESS: I don't have a specific statement
4 where I can, you know, paraphrase the purpose of Pauls
5 in a way that's well thought out and formulated here.
6 It's not in my declaration, but I -- when reading Pauls,
7 I had an understanding of what the purpose is. And when
8 forming my opinions about these various things in my
9 declaration, I considered not only the technical
10 disclosure of Pauls and Imai, but why they were doing
11 it, how they were doing it, what they said, and what
12 they did not say.

13 BY MR. PONDER:

14 Q. Is there a portion of your declaration that
15 contains all your opinions with respect to independent
16 claim 1?

17 MR. STONEDALE: Object to form.

18 THE WITNESS: Are you asking me if my opinions
19 regarding claim 1 are compartmentalized into a specific
20 selection of pages?

21 BY MR. PONDER:

22 Q. Yes.

23 A. I don't know if I can say that they're all
24 within a certain enumerated list of pages because some
25 opinions are spread out. I can certainly identify some

1 pages that contain opinions regarding claim 1. That's
2 easy to do by looking at the table of contents. So
3 again, I'm in the A version of the declaration. And you
4 can see that section V, that's Roman letter V, talks
5 about the requirements and limitation of 1[B]. So that
6 certainly has to do with claim 1.

7 Claim 7 talks about claims 1 and 20. And then
8 claim 6 doesn't expressly state claim 1 in the table of
9 contents, but I'm sure the material in there refers to
10 claim 1. So there is at least some portions that are
11 about claim 1.

12 Q. Is the term asymmetric compressure -- strike
13 that.

14 Are you familiar with the term asymmetric
15 compression encoder?

16 A. Yes.

17 Q. Is that a term that was used in this field of
18 art at the time of invention?

19 A. I would say that I'm not sure if it was. It
20 certainly wasn't common. And I would -- I did not
21 perform an exhaustive search of the literature prior to
22 this patent as to whether or not that phrase was used.
23 It was used by the inventors of this patent and other
24 similar patents by the same inventors quite a bit. So I
25 would tend to lean towards saying it was not used

1 outside of this patent, but I can't guarantee that it
2 was never used.

3 Q. Would a POSITA -- I guess put aside the issue
4 of whether it was commonly used. Were asymmetric
5 compression encoders known to POSITAs at the time of
6 invention?

7 MR. STONEDALE: Object to form.

8 THE WITNESS: Well, actually could I have a
9 copy of the patent?

10 BY MR. PONDER:

11 Q. Sure. I'm handing you what has been marked as
12 Exhibit 1001 in IPR2018-1187.

13 A. So if you look at column 10 near the top,
14 starting around line 9, there is a paragraph that
15 continues to line 20. And that paragraph discloses some
16 understanding as to what asymmetric means in this
17 context that you're asking me about.

18 And, in fact, let me just read one sentence.
19 It says, "An asymmetrical data compression algorithm is
20 referred to herein as one in which the execution time
21 for the compression and decompression routines differ
22 significantly."

23 So your question about whether a person of
24 ordinary skill in the art would be familiar with
25 asymmetric data compression algorithms prior to this

1 patent, I can say that certainly a person of ordinary
2 skill in the art would be familiar with algorithms,
3 compression algorithms, for which the execution time of
4 the compression and decompression routines differ
5 significantly.

6 Q. Now, in your answer you said that I referred to
7 the term asymmetric compression algorithm. And I had
8 actually asked about asymmetric compression encoders.
9 Is there a difference between an asymmetric compression
10 encoder and asymmetric data compression algorithm?

11 MR. STONEDALE: Object to form.

12 THE WITNESS: So if you turn to claim 1 of the
13 '477 patent, as an example, the phrase asymmetric data
14 compression encoder appears at least in two places I can
15 spot, one on line 60 of column 20 and one on line 64.
16 These are two "wherein" statements.

17 And I think this terminology is exactly what
18 you're asking me, those four words, asymmetric data
19 compression encoder. And my understanding of how a
20 person of ordinary skill in the art would understand
21 this when reading the claim would be that this is the
22 encoder of a data compression algorithm, which is an
23 asymmetric data compression algorithm. So it's like one
24 piece of the pair of encoder and decoder of an
25 algorithm, which is an asymmetric data compression

1 algorithm.

2 BY MR. PONDER:

3 Q. So is it your position that a person of
4 ordinary skill in the art at the time of invention would
5 have been familiar with asymmetric compression
6 algorithms?

7 A. In the sense that I said before regarding
8 column 10, in terms of that disclosure of what that
9 terminology means, yes, but not necessarily the phrase
10 asymmetric data compression algorithm.

11 Q. And it's also your opinion that a person of
12 ordinary skill in the art would have known that an
13 asymmetric data compression algorithm can be implemented
14 as two parts, an encoder and a decoder?

15 A. Well, generally speaking, most data compression
16 algorithms can be separated into an encoder and a
17 decoder, so that's more of a general concept.

18 Q. Would a POSITA have known or been familiar with
19 arithmetic data compression algorithms at the time of
20 invention?

21 A. Usually outside of the context of this patent,
22 such algorithms had a slightly different terminology.
23 They were called arithmetic coding algorithms. This
24 patent tends to omit the word "coding," but it is
25 perfectly clear what they mean. And the notion of

1 arithmetic coding algorithms was certainly known prior
2 to this patent.

3 Q. Okay. Would applying that general concept that
4 coding algorithms can be implemented with an encoder and
5 decoder piece, would that also apply to an arithmetic
6 coding method?

7 A. The fact that arithmetic coding has an encoder
8 and a decoder was certainly a known concept.

9 Q. Were POSITAs familiar with video data
10 compression encoders at the time of invention?

11 A. Yes.

12 MR. STONEDALE: Object to form.

13 MR. PONDER: I'm going to hand you an exhibit.
14 We'll mark it as Exhibit 1028.

15 (Exhibit 1028 was marked for identification.)

16 MR. PONDER: If you want to hold that up for
17 the camera so Mr. Stonedale can see it. It's basically
18 just a blank table.

19 THE WITNESS: You've got it, Joel?

20 MR. STONEDALE: I see it. Yes. Thank you.

21 BY MR. PONDER:

22 Q. So I thought this table might make it easier to
23 ask you a few questions about some compression
24 algorithms. Let me ask you: Do you recognize the terms
25 that appear in that first column where the first entity

1 says Lempel-Ziv going down to MPEG-2?

2 A. Yes.

3 Q. And what do those terms refer to as kind of a
4 general category?

5 A. These are various families of data compression
6 algorithms.

7 Q. So would you mind writing in above Lempel-Ziv
8 "data compression algorithm" to kind of give a heading
9 for that?

10 A. Actually, I'd prefer if you do the writing.

11 Q. Okay. So I'll hand that back to you.

12 And so I've now written in the first column
13 "data compression algorithm."

14 So for each of these algorithms, what I'd like
15 to do is ask you if you know whether each of the
16 algorithms is an asymmetric data compression algorithm.

17 So I'm thinking that perhaps if you can -- just
18 for the purposes of time, when I ask you for each one,
19 if you can just indicate yes that it is an asymmetric
20 data compression algorithm; no, it's your position that
21 it's not an asymmetric data compression algorithm; or
22 just say unsure if you don't have a belief right now in
23 this moment. Is that fair?

24 A. I can try.

25 Q. So let's -- and if you want me to write -- I'll

1 write and show it to you as we go.

2 So for the first data compression algorithm
3 being Lempel-Ziv, is that an example of an asymmetric
4 data compression algorithm?

5 A. Well, first of all, before answering this
6 question, let's go back to the '477 patent again at
7 column 10. And that same line that I mentioned before,
8 starting around line 12 or so where it says that "An
9 asymmetrical data compression algorithm...as one in
10 which the execution time for the compression and
11 decompression routines differ significantly."

12 And then I'll note below that, the last
13 sentence in that paragraph says that "Examples of
14 asymmetrical compression algorithms include
15 dictionary-based compression schemes such as
16 Lempel-Ziv."

17 Now, the determination of whether something is
18 asymmetrical or not could depend on various things such
19 as how it's implemented and maybe what processor is used
20 or what -- how a program is written or whether it's in
21 hardware or software. So there is not necessarily a
22 general answer of yes or no to an entire class of
23 algorithms.

24 Here it's noting that Lempel-Ziv is asymmetric,
25 and there are certain assumptions that are being made

1 about that that a person of ordinary skill in the art
2 would understand that typically if Lempel-Ziv were
3 implemented, it could be asymmetric.

4 And I think there is a similar description
5 about Huffman coding a few lines below, like around
6 line 24, as being symmetrical. But in general, it's a
7 question that would require some analysis. And I did
8 not offer any opinions about that in this IPR, but for
9 the question you just asked regarding Lempel-Ziv -- I
10 think that was the first one you asked.

11 Q. Yes.

12 A. So certainly as noted in column 10, there are
13 instances of Lempel-Ziv, which would be asymmetric,
14 but -- and then for Huffman also it's noted that it
15 could be symmetric. And I agree with those. But as to
16 the other ones that you have listed there, I didn't form
17 any opinions about those.

18 Q. Let me ask you: So you mentioned assumptions
19 that were made by the inventors of the '477 patent when
20 they described Lempel-Ziv as being asymmetric. What are
21 those assumptions?

22 A. Well, I think what they are stating here is the
23 fact that Lempel-Ziv is generally implemented in an
24 asymmetric way under ordinary circumstances that a
25 person of ordinary skill in the art would understand.

1 So it's in the context of the patent how an ordinary
2 person of skill in the art would implement Lempel-Ziv.

3 Q. So what would be the extraordinary
4 circumstances where a Lempel-Ziv algorithm would be
5 implemented so it is not asymmetric?

6 A. Well, it could be that --

7 MR. STONEDALE: Object to form.

8 THE WITNESS: Sorry. I mean, as an example,
9 conceivably you can have an encoder for Lempel-Ziv and a
10 decoder for Lempel-Ziv, each designed by different
11 people using different processors. Maybe one of them is
12 in hardware and one of them is in software where they
13 used different speed processors. Maybe one implementer
14 is a good programmer, the other is not.

15 There could be all sorts of differences which
16 could skew the results. Now, those wouldn't be typical.
17 That's not what's really being referred to here in the
18 ordinary sense that a person of ordinary skill in the
19 art would understand this column 10 disclosure to mean,
20 but it's not a blanket statement that under all
21 circumstances it's asymmetric.

22 BY MR. PONDER:

23 Q. So then to be accurate, is it more correct to
24 say that a Lempel-Ziv algorithm may be implemented as an
25 asymmetric data compression algorithm?

1 A. Well, I think it's stronger than that. I think
2 they're saying that typically it is and ordinarily it
3 is, and there would be no reason to expect an
4 extraordinary situation to occur where it's not.

5 Q. So then perhaps I should change my question to,
6 for all of these will be: Is the stated algorithm
7 typically asymmetric?

8 A. Well --

9 Q. If I ask that question, does that have a
10 reasonably certain meaning to you?

11 A. It's a good question and it has a good meaning,
12 but I didn't perform that analysis and I didn't offer
13 any opinions about those here. I can say the answer is
14 yes for Lempel-Ziv and for being asymmetric, and yes for
15 Huffman being symmetric as noted in column 10, but the
16 other ones I didn't offer any opinions about.

17 Q. So I'm going to write in -- for the first
18 column, I'm going to write in the heading is "typically
19 asymmetric." And for Lempel-Ziv, I'll write in yes.
20 And I'm going to add in Huffman to the bottom of the
21 table. And so should Huffman be no?

22 A. You can write whatever you want there.

23 Q. Well, what is your opinion, is Huffman
24 typically asymmetric?

25 A. Well, as I mentioned, as disclosed here,

1 Huffman is disclosed here as an example of symmetric.
2 And typically under ordinary circumstances, it would be
3 symmetric.

4 Q. So with respect to being -- the question being:
5 Is Huffman coding typically an asymmetric compression
6 algorithm, what would that answer be?

7 A. Well, Huffman coding is typically not
8 implemented in an asymmetric way.

9 Q. Okay. So then the answer would be no?

10 A. I just gave the answer.

11 Q. Okay. And then with respect to MPEG layer 1,
12 sitting here today, are you -- what is your answer on
13 whether it is typically asymmetric if your options are
14 for the purposes today of yes, no, or you're not sure?

15 A. Well, for all the remaining ones in your table,
16 as I mentioned --

17 MR. STONEDALE: Object to form.

18 THE WITNESS: I'm sorry. For all the remaining
19 ones in your table, as I mentioned, I did not perform an
20 analysis regarding that question. It wasn't necessary.
21 And so I don't have an opinion.

22 BY MR. PONDER:

23 Q. You're a person of ordinary skill in the art;
24 correct?

25 A. I'm beyond ordinary, I would think.

1 Q. Okay. You're an extraordinary person of the
2 skill in the art; correct?

3 A. I believe so.

4 Q. Would a person of ordinary skill in the art
5 know what these algorithms are?

6 A. They would have familiarity with these
7 algorithms, yes.

8 Q. And if I asked them the question of whether
9 this algorithm -- a particular algorithm is typically
10 asymmetric, is that something that a person of ordinary
11 skill in the art would know?

12 A. Well, they would have to think about it.

13 Q. How long would they have to think about it?

14 A. I didn't perform an analysis about how long a
15 person of ordinary skill in the art would have to think
16 about it. But typically when a person of ordinary skill
17 in the art reads a patent for which they have ordinary
18 skill in the art of, they may have to think about some
19 of the concepts. And in order to practice a patent,
20 they don't instantly do it. It takes them thought.
21 They have to consider how they're going to make and use
22 it basically.

23 Q. Where does the '477 patent describe how the
24 person of ordinary skill in the art would determine
25 whether compression algorithm is an asymmetric data

1 compression algorithm?

2 A. Well, I think -- again, I'll refer you to
3 column 10 of the '477 patent, the paragraph from lines 9
4 to line 20 gives some information about what it means to
5 be an asymmetric data compression algorithm.

6 Q. You say "gives some information." Does this
7 portion give all the information a person of ordinary
8 skill in the art would need to know to determine whether
9 a particular compression algorithm is an asymmetric data
10 compression algorithm?

11 A. Well, the notion of asymmetric data compression
12 algorithm comes into the claims of the '477, or at least
13 the encoder aspect of it. I think the algorithm part
14 does also. I think what you're asking me is a question
15 regarding written description now about whether there is
16 support in the specification for the terminology in the
17 claims, and that didn't play a role in this IPR and I
18 didn't offer any written description type of opinions.

19 Q. So you don't think it is important for a person
20 trying to analyze the claims of this patent to be able
21 to determine whether a particular compression algorithm
22 is an asymmetric data compression algorithm?

23 A. When you say "important," are you asking for a
24 person that wants to practice the claim?

25 Q. Person trying to render opinions about the

1 scope and meaning of the claims of the '477 patent.

2 A. Well, it depends to what extent a person would
3 want to render an opinion regarding the scope and
4 meaning. For the purposes of this IPR, a complete
5 analysis of the scope of all the words in all the claims
6 was not necessary to resolve the issues at hand. So I
7 think only certain aspects of the scope of the meaning
8 was necessary to understand. And a complete analysis of
9 the scope of the phrase asymmetric data compression
10 algorithm was not necessary in order for me to read and
11 understand the petition and the expert report and offer
12 my rebuttal opinions.

13 Q. What did you understand the scope of your
14 assignment with respect to considering this patent?

15 A. Well, my job is --

16 MR. STONEDALE: Object to form.

17 Also, I want to caution the witness not to say
18 anything privileged.

19 THE WITNESS: My job was basically to read and
20 understand the petitions and the expert declaration from
21 Dr. Storer and provide my opinions about whether or not
22 I agree or disagree with various of the opinions in the
23 expert report and various of the statements in the
24 petition, and that's what I did.

25 ///

1 BY MR. PONDER:

2 Q. Are you aware that Dr. Storer provided opinions
3 on whether various compression algorithms are asymmetric
4 data compression algorithms?

5 A. Yes, I'm aware of that.

6 Q. Did you provide a rebuttal opinion as to those
7 opinions?

8 A. First, as a general answer, I did not provide a
9 rebuttal opinion to every single opinion he offered in
10 his expert report nor to every statement that appeared
11 in the petition. There was quite a bit of those. I
12 provided opinions regarding certain of those, and I
13 don't recall providing opinions regarding the symmetry
14 or asymmetry of various algorithms as opined by
15 Dr. Storer.

16 Q. So did you approach this engagement as an
17 exercise in trying to find where you disagree with
18 Dr. Storer's opinions?

19 A. As I said before, I --

20 MR. STONEDALE: Object to form.

21 THE WITNESS: As I said before, I provided
22 opinions both in agreement and disagreement to
23 Dr. Storer. And as an example, I think he agrees -- if
24 I remember correctly -- that Lempel-Ziv was typically
25 asymmetric and Huffman was symmetric. I don't recall

1 specifically if he said both of those, but I think he
2 did.

3 So those are some areas of agreement.
4 Sometimes the -- some of the opinions I did not respond
5 to and some I did. So I can just leave it at that.

6 BY MR. PONDER:

7 Q. You didn't provide a general opinion as to
8 whether you believe the '477 patent is valid; correct?

9 A. As I note in my objective was to rebut the
10 opinions in the expert report in the petition. I did
11 not provide a separate opinion affirmatively saying
12 whether the claims were valid, although I'll note that I
13 certainly did not see any reason why they were not
14 valid.

15 Q. So turning back to this issue of asymmetric
16 data compression algorithms. How much analysis is
17 required to determine whether a particular data
18 compression algorithm is an asymmetric data compression
19 algorithm?

20 A. As I stated before, I didn't perform an
21 analysis to determine how much analysis a person of
22 ordinary skill in the art would need. I did point to
23 column 10 near the top where it gives some description
24 of what it means to be an asymmetric data compression
25 algorithm. So whether it's a couple hours, I don't know

1 exactly. I didn't think about that in great detail, but
2 I don't think it would be too burdensome for a person of
3 ordinary skill in the art. I'm sure they can figure it
4 out.

5 Q. Is it your opinion that a person of ordinary
6 skill in the art wouldn't know, just as part of the
7 knowledge the POSITA would have, whether a given data
8 compression algorithm is an asymmetric data compression
9 algorithm?

10 A. Well, there is quite a bit of algorithms out
11 there in the world. There is not just the ones with
12 names like in your table. People come up with their own
13 algorithms all the time. I do that myself.

14 And it actually would be quite simple to answer
15 this question. If I had an algorithm that I wrote and
16 saw for myself, for example, I would simply take the
17 encoder, run it on some data, and then run it on the --
18 run the decoder and I would just time it. And that
19 would tell me, you know, whether -- as is stated in
20 column 10, whether the execution time for the
21 compression and decompression algorithms differ
22 significantly.

23 So it would be quite a simple exercise if I had
24 a computer in front of me with an algorithm, but sitting
25 here in a deposition, it's a little bit difficult to

1 answer these questions.

2 Q. So you believe a person of ordinary skill in
3 the art to answer this question would have to look at an
4 implementation of one of these compression algorithms to
5 answer the question?

6 A. Well, I'm not sure what you mean by "look at,"
7 but certainly one example of how they could conduct a
8 process to determine the answer would be to take
9 instances of the algorithm in software, run them and
10 time them, or they could have two pieces of a hardware
11 and they can compare those, or they can read technical
12 specifications that tell how much CPU cycles are
13 required. There are many different ways of doing it.

14 Q. Are you familiar with MPEG layer -- strike
15 that.

16 Are you familiar with MPEG layer 3?

17 A. Yes.

18 Q. And is that referred to as MP3?

19 A. I think that some people -- actually, I don't
20 recall the abbreviations, but that's certainly possible.

21 Q. Are you familiar with what MP3s are?

22 A. I don't remember all the technical details of
23 all the different MPEGs. I'd have to review that. I
24 didn't specifically review those details for this
25 deposition.

1 Q. Have you heard of a device known as the Apple
2 iPod?

3 A. Yes.

4 Q. Are you familiar with what format the Apple
5 iPod uses for storing music?

6 A. I don't recall offhand.

7 Q. Do you remember seeing any articles or
8 discussion about how the music industry was
9 revolutionized by the distribution of MP3 files
10 throughout the industry?

11 A. There certainly was a lot of articles about
12 that concept.

13 Q. But you don't remember which algorithm was the
14 most commonly used audio algorithm?

15 A. Not specifically offhand.

16 Q. But you consider yourself an expert in the area
17 of audio coding techniques?

18 A. I certainly have a lot of expertise in that
19 area.

20 Q. But sitting here today, you have no reason to
21 disagree that MPEG-1 layer 3 is commonly referred to as
22 MP3 in this space?

23 A. Yeah, I think so, but, you know, without
24 knowing exactly offhand all the different abbreviations,
25 I don't want to commit myself to it.

1 Q. And it's your opinion that a person of ordinary
2 skill working in this field wouldn't know whether MPEG
3 layer -- MPEG-1 layer 3, or MP3, is an asymmetric data
4 compression algorithm?

5 A. Well, as I said, it's not a question of
6 knowing. It's a question of determining. So a person
7 of ordinary skill in the art would have to have a basis
8 for knowing whether a particular algorithm is asymmetric
9 or not. Now, one basis could be that they, as I stated,
10 they could just perform a very, very simple quick
11 experiment and run it and time it, and answer the
12 question for themselves. They can look at a technical
13 description of the algorithm and they can determine that
14 way whether one is fast -- whether it is asymmetric or
15 not.

16 If you're suggesting that they should look at
17 popular media and somebody tells them it is, well, I'm
18 not sure that's what a skilled person would do. I think
19 a skilled person would want to know from a technical
20 standpoint whether it is asymmetric or not, and they
21 could easily determine that.

22 Q. Let's -- because I do want to make sure we have
23 a chart here that accurately reflects your answer to the
24 question of whether particular algorithms are typically
25 asymmetric.

1 For MPEG-1 layer 3, would the correct answer be
2 you don't have an opinion?

3 A. I don't have an opinion right now. The
4 remainder of the table as I stated before.

5 Q. Okay. I'm just writing that in.

6 I'm handing you Exhibit 1028. I don't know if
7 you want to go ahead and show that to Mr. Stonedale just
8 so he can see what it looks like now.

9 THE WITNESS: You got that, Joel?

10 MR. STONEDALE: All right. Thank you. I see
11 it.

12 THE WITNESS: That's written by him, not me.

13 MR. STONEDALE: Thank you.

14 Yeah, I gathered. Thanks.

15 BY MR. PONDER:

16 Q. Dr. Zeger, looking at what's been marked as
17 Exhibit 1028, with respect to the second column, which
18 is an attempt to summarize your testimony as to whether
19 these particular data compression algorithms are
20 typically asymmetric, do you agree with the summaries?

21 A. I think that's accurate.

22 Q. I wanted to ask you about H.263. Are you
23 familiar with H.263?

24 A. Yes.

25 Q. And what is H.263?

1 A. It's a data compression algorithm.

2 Q. Does it have a typical application or use?

3 A. Video.

4 Q. And what types of context is H.263 used for
5 video? Telecommunications, video broadcasting, can you
6 give any examples?

7 A. There is different applications.

8 Q. Have you ever heard of an H.263 algorithm
9 that's been implemented as a symmetrical data
10 compression algorithm?

11 A. Well, typically when H.263 or, for that matter,
12 any other algorithm is implemented, the determination as
13 to whether it is symmetrical or asymmetrical in the
14 sense of the '477 patent would be something that would
15 take some data gathering to determine.

16 So as I mentioned before, if you have the
17 software, you can just run it and easily test whether it
18 is symmetrical or not. Usually there is not an
19 announcement as to whether it is symmetrical or
20 asymmetrical.

21 So if you're asking me have I ever heard of a
22 case where it's symmetrical, I haven't heard of a case
23 where it's neither -- either symmetrical or
24 nonsymmetrical. It is not usually a publicized fact. I
25 didn't specifically perform an experiment on H.263 for

1 today's deposition to determine that fact, and that's
2 why I don't have an opinion about that.

3 Q. Are you familiar with MPEG?

4 A. Yes.

5 Q. And is MPEG another type of video compression
6 algorithm?

7 A. Yes.

8 MR. PONDER: Why don't we go ahead and take a
9 break.

10 (Recess, 10:25 a.m. to 10:40 a.m.)

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

12 BY MR. PONDER:

13 Q. Dr. Zeger, I wanted to talk to you a little bit
14 about some of the terms and phrases that appear in the
15 patent. Have you heard the term "compression ratio"?

16 A. Yes.

17 Q. And is the term "compression ratio" something
18 that would have been familiar to a person of ordinary
19 skill in the art at the time of invention?

20 A. Yes.

21 Q. And what would a person of ordinary skill in
22 the art at the time of the invention understood
23 "compression ratio" to mean?

24 A. Well, it's basically a ratio of the bits going
25 in and the bits going out of a compressor. So, for

1 example, if the compression ratio were 2 to 1, that
2 would mean the amount of bits coming out is half as much
3 as the amount of bits going in.

4 Q. Is "compression rate" a term that was used by
5 POSITAS at the time of invention?

6 A. The particular use of "compression rate" in the
7 patent, the '477 patent, is a little bit different than
8 what the ordinary understanding outside of the context
9 of the patent would be.

10 Q. Let me start by asking you about what the
11 ordinary meaning of compression rate would have been.
12 So let me ask you: Is "compression rate" a term that
13 was generally used by persons of ordinary skill in the
14 art at the time of the invention?

15 A. You're referring to outside of the patent?

16 Q. Outside the context of the patent.

17 A. Well, certainly the term "rate" by itself
18 without the word "compression" in front of it was used
19 outside of the patent. There is an entire field of
20 what's called source coding where there is study of a
21 traditional trade-off between what's called rate and
22 distortion. And that's for lossy coding, l-o-s-s-y, or
23 lossy compression.

24 Whether the phrase "compression rate" with the
25 word "compression" in there was known outside of the

1 patent, I wouldn't say that that phrase was particularly
2 common or even used. I can't say it was never used, but
3 it certainly was not common, but "rate" was used, and
4 "rate" was used in a different sense than in the patent.
5 The patent uses "compression rate" in the sense of how
6 much time it takes to execute an encoding operation,
7 whereas it had a different meaning outside of the
8 context of the patent.

9 Q. What was the meaning -- what was the meaning of
10 "compression rate" outside of the sense of the
11 '477 patent?

12 A. As I stated in my previous answer, the phrase
13 "compression rate" with both of those words in there was
14 not typically used outside of the patent, but the word
15 "rate" by itself was. So are you asking me just about
16 the word "rate" alone?

17 Q. No. I'm trying to understand what a person of
18 ordinary skill would have understand what the full
19 phrase "compression rate" would have meant at the time
20 of invention.

21 A. I think that's a term that is specifically
22 defined in this patent. So I'm not sure a person of
23 ordinary skill in the art would have an ordinary
24 understanding of that phrase outside the context of this
25 patent, or perhaps there is other patents that define

1 that terminology in either the same or different way,
2 but it certainly was not common.

3 Q. And what is the meaning of "compression rate"
4 that is given by the '477 patent?

5 A. I think there is a paragraph in my declaration
6 somewhere. I'll look for it. If you know where it is,
7 you can point me to it.

8 I think if you look in the patent in column 1
9 around line 65 or so, there is a sentence that starts
10 the paragraph and there is a phrase within that sentence
11 that says, "execution speed of the algorithm" and then
12 in parentheses it says "(compression rate)." So that
13 gives some understanding to the meaning.

14 Q. So are you referring to the '477 patent at
15 column 1, 63 to 67?

16 A. Yes.

17 Q. And you're pointing out that there is a -- this
18 phrase that starts after the word "between" that says,
19 "execution speed of the algorithm (compression rate)"?

20 A. That is correct.

21 Q. You think that that statement there, that
22 "execution speed of the algorithm (compression rate)" is
23 definitional for compression rate?

24 MR. STONEDALE: Objection to form.

25 THE WITNESS: I'd like to find the paragraph in

1 my declaration where it discusses for more clarity.

2 BY MR. PONDER:

3 Q. Take your time.

4 A. Okay. So in my declaration -- this is
5 Exhibit 2002, what we call A -- in paragraph 36, which
6 is on page 15, I note that the "Petition defines 'data
7 compression rate' as 'the execution or algorithmic speed
8 of a compression encoder.'"

9 And then it further notes that, quote, "it is
10 the throughput of the asymmetric data compression
11 encoder measured by the amount of input data that it can
12 compress per unit of time at a given compression ratio."

13 So that's what the petition says and I use that
14 definition in my analysis and that's consistent with
15 what I pointed to in column 1 of the '477 patent.

16 Q. So do you agree that the petition correctly
17 defines the broadest reasonable meaning of "data
18 compression rate" as summarized in page 36 of your
19 declaration?

20 A. I didn't offer an opinion about that here. I
21 just used their -- used the petition's definition in my
22 analysis as to whether I agree or disagree with various
23 opinions, but I do notice it does seem to be consistent
24 with the way the patent describes it.

25 Q. One question I have for you is this. The

1 original question I asked you about was "compression
2 rate," and you're pointing me to the petition's
3 definition of "data compression rate." Is it your
4 understanding that the term "compression rate" is the
5 same as "data compression rate" in the '477 patent?

6 A. So in the '477 patent, claim 1, I can see in
7 the second wherein clause, they used the expression
8 "data compression rate." I don't recall offhand if
9 "compression rate" without the word "data" appears in
10 the claim language, but it definitely occurs with it.

11 Now, I pointed to column 1 where "compression
12 rate" appears at line 66 in parentheses without the word
13 "data" there, but I believe that that's really referring
14 to the same thing, because obviously they are
15 compressing data. It's just whether they have the word
16 "data" there or not. I think a person of ordinary skill
17 in the art would understand those to be the same.

18 Q. So in forming your opinions, you accepted the
19 petition's definition of "data compression rate"?

20 A. I wouldn't -- I wouldn't use the word
21 "accepted." I used the petition's definition and I note
22 that it seems to be consistent with the patent itself.

23 Q. But you're not expressing an opinion that the
24 petition's definition of "data compression rate" is the
25 correct definition of "data compression rate" as that

1 term is used in the claims of the '477 patent?

2 A. I don't particularly have an objection to it.
3 It seems fairly accurate to me, but I can't say that I
4 performed an in-depth analysis to make sure it's the
5 absolutely best way of construing that term, but it
6 seems okay.

7 Q. So you're not, sitting here today, able to say
8 that if you were asked to express an opinion on the
9 correct construction of the term "data compression
10 rate," what you think "data compression rate" would
11 mean?

12 A. As I said, I think it's fairly accurate. It's
13 consistent with the patent's disclosure, especially like
14 in column 1 around line 65, and it seems to be
15 consistent with the claim language. So I apply that
16 because that's what the petition used. And I don't
17 particularly see anything objectionable about it.

18 Q. What I'm trying to understand is whether you
19 would want to do further analysis to be sure that "data
20 compression rate" as the definition in the petition is
21 the correct meaning of "data compression rate" for the
22 '477 patent?

23 A. Well, I think for the purposes --

24 MR. STONEDALE: Object to form.

25 THE WITNESS: I needed to construe the term

1 "data compression rate" because it's part of the claim
2 language and I needed to construe it to the extent that
3 I can offer opinions that are significant for this
4 particular IPR under the BRI standard. And to the
5 extent that I needed to resolve issues for this IPR, I
6 think it's construed enough the way it's given by the
7 petition in this quote that I have in my paragraph 36
8 and also in conjunction with column 1 of the
9 '477 patent. So I don't think any more construction is
10 necessary to resolve the issues in this IPR.

11 BY MR. PONDER:

12 Q. So are you stating in your declaration that the
13 petition's definition of "data compression rate" is a
14 correct definition of that term as it's used in the
15 '477 patent applying the broadest reasonable
16 interpretation standard?

17 A. I think my previous answer -- I'll just say the
18 same answer again.

19 Q. I think the board is going to really want a
20 clear answer on whether you agree that the broadest
21 reasonable interpretation of "data compression rate"
22 means the execution or algorithmic speed of a
23 compression encoder.

24 A. Well, again, maybe I'm repeating myself a
25 little bit, but in my 36, my paragraph 36, I have

1 several quotes from the petition that explain the
2 petition's understanding or usage of what the phrase
3 "data compression rate" means.

4 The first of those is what you just stated,
5 which was the execution or algorithmic speed of a
6 compression encoder, and that was further clarified by
7 noting that it's measured by the amount of input data
8 that it can compress per unit of time at a given
9 compression ratio.

10 And then I further noted that that's consistent
11 with what appears in column 1 around line 65. All of
12 those together, I believe, are accurate and describe
13 under the BRI standard what the meaning of "data
14 compression rate" is.

15 Now, whether you would want to take all those
16 and condense them and remove some words and try to make
17 it more concise, that might be a further operation of
18 claim construction which I didn't offer an opinion
19 about. So I'm not sure this is the most concise way of
20 saying it, but it certainly expresses the concept.

21 Q. Do you believe that the clarification that
22 you -- what you've referred to as the clarification in
23 paragraph 36, that the petition states "It further notes
24 that it is the throughput of the asymmetric data
25 compression encoder measured by the amount of input data

1 that it can compress per unit of time at a given
2 compression rate," is narrower or broader than the
3 execution or algorithmic speed of a compression encoder?

4 MR. STONEDALE: Object to form.

5 THE WITNESS: I think you misstated something
6 there. I'm not sure that's the question you want to
7 ask, because you added the word "rate" instead of
8 "ratio" at the very end of the quote.

9 BY MR. PONDER:

10 Q. I mean ratio.

11 A. I'm sorry, but I lost track of the question.

12 Q. So you point out that the petition defines data
13 compression rate as the execution or algorithmic speed
14 of a compression encoder. You agree with that
15 statement; correct?

16 A. Again, I'm sorry to nitpick, but you misstated
17 that one also. You said "coder" instead of "encoder" at
18 the end, at least I think you did.

19 Q. I didn't mean to do that. Let me ask again.

20 A. By the way, my feed, I think, has died.

21 Oh, I take it back.

22 (Reporter clarification.)

23 BY MR. PONDER:

24 Q. Do you agree with the petition's definition
25 that data compression rate -- strike that.

1 What I want to do is ask you about these two
2 separate sentences that you have in paragraph 36, the
3 second and third sentences.

4 So turning to the first sentence, it says, "And
5 the petition defines 'data compression rate' as 'the
6 execution or algorithmic speed of a compression
7 encoder.'" Do you agree with that?

8 A. Well, I think that that quote together with the
9 further note that further clarifies that it's the amount
10 of input data that can be compressed per unit of time at
11 a given compression ratio and together with what's in
12 column 1 of the '477 together give a reasonable
13 understanding or construction of the phrase "data
14 compression rate." Whether one of those by themselves
15 is a definition, if that's what you're asking, I'm not
16 sure that's good enough. I think it's better to have
17 the clarity of all these together.

18 Q. Okay. So do you agree that the portion that
19 says, "it is the throughput of the asymmetric data
20 compression encoder measured by the amount of input data
21 that it can compress per unit of time at a given
22 compression ratio" is a requirement that comes from the
23 patent's discussion of execution speed of the algorithm
24 (compression rate)?

25 MR. STONEDALE: Object to form.

1 THE WITNESS: I think there is some other
2 locations in the patent that give further understanding
3 to this meaning, which I can -- if you'd like, I can try
4 to look for them.

5 BY MR. PONDER:

6 Q. That would be helpful.

7 A. Okay. Okay. I've looked through a lot of the
8 '477, but not the whole thing. I don't offhand see a --
9 other than column 1 anything regarding compression rate
10 that is specifically definitional, but there are a
11 number of uses of the phrase "data compression rate" or
12 "compression rate" that are consistent with what is
13 described at the bottom of column 1 around line 65.

14 And it's -- I think it's very clear to a person
15 of ordinary skill in the art when reading the '477 that
16 when they see "data compression rate" that it's
17 referring to the same concept that is in the bottom of
18 column 1, which as I mentioned, is also consistent with
19 the notions in my paragraph 36 that the petition
20 gives -- but I will note one thing that in my
21 paragraph 36, in the second quote that I describe from
22 the petition where it says, "It further notes that,"
23 it's really the latter half of that quote that's
24 significant.

25 It's not the fact that it is throughput of the

1 data -- the asymmetric data compression encoder, but
2 rather the fact that it's measured by the amount of
3 input data that it can compress per unit of time at a
4 given compression ratio. So it doesn't have to be an
5 asymmetric data compression encoder for this to be true.

6 Q. Was it common in the field of art to measure
7 the execution or algorithmic speed of a compression
8 encoder by the amount of input data that the encoder can
9 compress per unit of time at a given compression ratio?

10 A. Well, the algorithmic speed of any algorithm
11 could be measured in a number of different ways,
12 depending on what is of interest. And generally it
13 involves measuring some aspect of how long it takes to
14 do something and -- or how much data can be processed in
15 a particular amount of time under certain constraints
16 perhaps.

17 So the specific part of your question asking
18 about whether measuring the amount of input data that
19 can be compressed per unit of time at a given
20 compression ratio was a common way to do it, it's
21 certainly one way to do it. I don't have statistics on
22 which ones were the most common, which were not. There
23 are lots of different ways of measuring it, but this
24 patent makes clear what "data compression rate" refers
25 to in that regard.

1 Q. Have you ever seen this particular way of
2 measuring data compression rate being described in
3 writing relative to this field of art at the time of the
4 invention?

5 A. I've certainly seen this concept being used
6 before, but not necessarily with this particular
7 terminology as calling it "data compression rate," so
8 the terminology is somewhat particular to this patent.

9 Q. What terminology do you commonly or more often
10 see used for this concept?

11 A. Often there is -- when somebody measures the
12 rate of an algorithm, there may not be a specific
13 terminology, but rather a practitioner of the
14 terminology or a theoretician or a programmer would just
15 describe the method of measuring a particular
16 compression rate with an equation or a formula or a
17 descriptive sentence involving it. So there may not be
18 a terminology.

19 And, in fact, part of the problem is that the
20 word rate by itself, r-a-t-e, is used in many, many
21 different contexts outside of this patent. So often it
22 can be confusing without proper context as to what is
23 meant, but this patent certainly provides the context to
24 clarify that, so there is no issue here. But the word
25 "rate" does get overused outside of this patent.

1 Q. Is the term "execution speed" a word that was
2 known and used by persons of ordinary skill in the art
3 at the time of the invention?

4 A. Yes.

5 Q. And what would a person of ordinary skill in
6 the art ascribe as the meaning of "execution speed" at
7 the time of the invention?

8 MR. STONEDALE: Object to form.

9 THE WITNESS: Well, I guess I should back up.
10 Instead of just saying yes to the previous question, I
11 should clarify that it was certainly known, but it
12 could have different meanings depending on the context,
13 just as in the previous answer about data compression
14 rate.

15 "Execution speed" could have meanings outside
16 of this patent, for example, how long it takes an
17 algorithm to run from start to finish as measured in
18 seconds, for example. It could be measured in the
19 number of steps executed on a particular computer. It
20 could be measured in the number of CPU cycles. And it
21 could be execution speed of a particular subroutine
22 within a program. There is many different concepts of
23 it.

24 But the yes part of my previous answer really
25 was getting to the fact that a person of ordinary skill

1 in the art certainly would have heard that phrase
2 "execution speed," that was common, but it could have
3 had multiple contextual meanings.

4 BY MR. PONDER:

5 Q. What would the plain and ordinary meaning of
6 "execution speed" be to a person of ordinary skill in
7 the art at the time of the invention apart from reading
8 its usage in the context of the '477 patent?

9 A. So you're asking me what the plain and ordinary
10 meaning would be to a person of ordinary skill in the
11 art outside of the context of this patent?

12 Q. Basically what I'm asking is: If we took the
13 person of ordinary skill in the art back at that time
14 and right before we gave them the '477 patent, asked
15 them, "Hey, what does 'execution speed' mean to you?"
16 what do you think they would say?

17 A. Well, just --

18 MR. STONEDALE: Object to form.

19 THE WITNESS: Well, let me just try to directly
20 answer the question. A person in that hypothetical
21 situation would most likely come back with the question,
22 which is "Execution speed of what?" And they would ask
23 what are you talking about. So you'd kind of have to
24 fill in some blanks there.

25 ///

1 BY MR. PONDER:

2 Q. How about we ask them what would be the
3 execution speed of a compression algorithm?

4 A. Okay. Then a person asked that question would
5 say, "Well, it could mean one of several things
6 depending on exactly what you're interested in." It
7 could be a measurement of how much time it takes from
8 start to finish to execute a particular compression
9 algorithm. It could be something that's similar to
10 what's -- what I'm quoting in paragraph 36. It could be
11 the amount of input data that could be compressed per
12 unit of time at a given compression ratio, or it could
13 be lots of other variations on that.

14 Ultimately, it's a measure of something,
15 whether it be data process -- how much data is
16 processed, how many seconds it takes for something to
17 happen, how many CPU cycles are used, something of that
18 nature. It's a counting process.

19 Q. Would performing these sorts of calculations be
20 something that was well within the level of skill of a
21 person of ordinary skill?

22 A. Yes.

23 Q. Is "algorithmic speed" another term that
24 POSITAS were using at the time of the invention?

25 A. I think "algorithmic speed" would be something

1 that was not uncommon, but again, it really depends on
2 the precise context and parameters as to what it meant.
3 There is a lot of possible variations on similar themes,
4 so one would need to clarify what these mean.

5 It is very common in, for example, technical
6 seminars when somebody uses a phrase like "execution
7 speed or rate" or "algorithmic speed" for people in the
8 audience to raise their hand and say, "Could you be more
9 precise so we understand exactly what you mean?"

10 Q. Would a person of ordinary skill assign a
11 different meaning to "execution speed" and "algorithmic
12 speed" or would both terms kind of conjure the same
13 concerns as you've identified for like "execution
14 speed"?

15 A. Is it algorithmic speed --

16 MR. STONEDALE: Object to form.

17 THE WITNESS: I'm not sure where "algorithmic
18 speed" comes up. Could you point me to where that is?

19 BY MR. PONDER:

20 Q. What are some of the ways that you can define
21 the execution speed of an algorithm?

22 A. As I mentioned before one way outside of the
23 context of this patent would be to time the run time of
24 an algorithm from start to finish and measure that in
25 seconds. Or you can measure it in CPU cycles.

1 Or, as I mentioned in my paragraph 36, if the
2 algorithm is a data compression encoder, you can measure
3 it by the amount of input data that can be compressed
4 per unit of time at a given compression ratio. Those
5 are some examples.

6 Q. When you refer to timing the algorithm, the run
7 time of the algorithm, would that be assuming a certain
8 data set applied to the algorithm?

9 A. Well, it could depend on the data. That's
10 possible.

11 Q. Would it depend upon the system that the
12 algorithm is running on?

13 A. That could be true.

14 Q. Do data compression algorithms -- strike that.
15 Is it common for implementers of data
16 compression algorithms to write their own code
17 implementing a compression algorithm?

18 A. Well, I haven't taken a survey about whether
19 implementers of data compression algorithms write their
20 own codes. There is a lot of people in the world that
21 do that. I can give you an example. I personally do, a
22 lot of my colleagues do, but a lot of people that are
23 not skilled in the art certainly don't.

24 Q. If two persons of ordinary skill in the art
25 wrote their own implementations of a compression

1 algorithm, will they have the same execution speed?

2 A. They could.

3 Q. Are they certain to have the same execution
4 speed?

5 A. No.

6 Q. Why are they not certain to have the same
7 execution speed?

8 A. You're giving me a hypothetical without knowing
9 the details, but, you know, conceivably they have
10 different processors. Depends how you define "execution
11 speed" also. They might have written a program in a
12 different way. There is many reasons.

13 Q. Let's assume that they are written -- the
14 implementations are written in the same source code
15 language on the same machine, they use the same
16 compiler. Okay. With those assumptions, would two
17 different implementations of the same algorithm be
18 certain to have the same execution speed?

19 A. Well, I think to answer that, I --

20 MR. STONEDALE: Object to form.

21 THE WITNESS: To answer that, I would need to
22 know which definition of execution speed you're using.

23 BY MR. PONDER:

24 Q. Let's go with just run time first.

25 A. Run time measured in seconds or CPUs?

1 Q. In seconds, yes. On seconds using the same
2 input data.

3 A. Okay. And part of your hypothetical allows for
4 different software even though it is the same processor
5 and compiler?

6 Q. The implementation, yes. The implementation of
7 the compression algorithm is separately written.

8 A. So one of your hypothetical programmers might
9 have written a very efficient software and the other
10 might have written it inefficiently.

11 Q. If that's possible, yes.

12 A. Okay. Well, I think it's tautological then
13 that if one of them writes it slower than the other
14 person, then the -- in a way so that it would run
15 slower, then it would run slower.

16 Q. Okay. How is it possible that a person of
17 ordinary skill in the art implementing a compression
18 algorithm can write it more efficiently versus less
19 efficiently?

20 A. Well, a person could use good programming
21 skills or poor programming skills.

22 Q. So does that mean that there is an element of
23 programming skill in implementing an algorithm that
24 affects its execution speed?

25 A. Well, the execution speed as measured in the

1 way you said, which is time, which is different than
2 what is noted here in my paragraph 36, for example, that
3 the petitioner assumes, if you're measuring execution
4 speed and time, then different programs can run
5 different times.

6 Q. Let's modify the hypothetical by changing how
7 the execution speed is measured. If we instead measure
8 execution speed using CPU cycles, would the two
9 separately written implementations of a compression
10 algorithm have the same execution speed?

11 A. It's a very similar answer to the previous one.
12 Generally the run time of a computer program is -- it's
13 a complicated thing to calculate theoretically because
14 each instruction, if it's at a high level or low level,
15 even if it's in a machine code level, there can be
16 multiple machine cycles that are going on.

17 Not every machine code or not every, let's say,
18 assembly instruction has the same number of CPU cycles.
19 So if two different programs are written and one is
20 written -- again, I'll use the phrase efficiently and
21 inefficiently, then certainly the CPU cycles could
22 reflect that fact.

23 Q. Is the reason why a person of ordinary skill in
24 the art can write an implementation that is either more
25 or less efficient because they have to make a choice of

1 how to convert steps of the algorithm into specific
2 instructions for the machine?

3 MR. STONEDALE: Object to form.

4 THE WITNESS: That could be one example that
5 plays a role. There certainly could be other reasons.

6 BY MR. PONDER:

7 Q. What are some of the other reasons?

8 A. A person might just have a high skill level in
9 programming. They might use inefficient techniques.
10 They might make errors when they code. Are you assuming
11 the same programming language when you say same
12 compiler? Okay. I'm sure there is others I just can't
13 think of right now.

14 Q. So if you're using the same programming
15 language, are you saying that one of the factors is
16 there can be more than one way to write source code that
17 accomplishes the same result?

18 A. That is certainly true.

19 Q. And if you write different source code that
20 accomplishes the same result, that source code may
21 result in differences in the specific machine
22 instructions executed?

23 A. Different programmers certainly result in
24 different machine instructions that are executed.

25 Q. And then because of the difference in the

1 machine instructions, that can impact how fast or slow
2 the execution speed of the algorithm would be on the
3 machine?

4 A. If you measure execution speed --

5 MR. STONEDALE: Object to form.

6 THE WITNESS: If you measure execution speed as
7 number of CPU cycles or number of seconds, which is
8 different than I mentioned in paragraph 36 in my
9 declaration, then the answer would be yes.

10 BY MR. PONDER:

11 Q. Have you heard of the term "lossless
12 compressor"?

13 A. Yes.

14 Q. What is a lossless compressor?

15 A. Well, generally speaking, data compression is
16 usually subdivided into two large categories. One is
17 called lossless and one is called lossy, l-o-s-s-y.

18 And lossless compression consists of taking
19 input data and generally compressing it or trying to
20 reduce the size of it in a way that it can be fully
21 reconstructed back to its original form without any
22 loss.

23 So that would mean, for example, if you had a
24 file of, let's say, one megabyte worth of data and you
25 compressed it in a 2-to-1 fashion down to half a

1 megabyte of data using a lossless encoder, then a
2 lossless decoder that corresponds to it could take that
3 half a megabyte compressed file, get it back up to
4 one megabyte uncompressed and it would be identical to
5 the original one. So this is in contrast to lossy where
6 you might not have an identical reconstruction.

7 Q. Are you familiar with the concept that a data
8 representation, the input data, has a certain
9 information level or entropy, e-n-t-r-o-p-y?

10 A. I certainly know what entropy is.

11 Q. What does that mean?

12 A. What does entropy mean?

13 Q. Yes, in the context of data compression.

14 A. This is where I have to ask if you want the
15 two-hour version or the executive summary?

16 Q. Executive summary.

17 A. Okay. I teach this in my classes. So
18 basically the gist of it is that if you have what's
19 called a discrete source, which is a random variable
20 that can take on, let's say, for example, a finite
21 number of possibilities -- maybe easy to illustrate
22 using an example.

23 So if you have a randomly chosen English
24 alphabet, letter A through Z, let's say all lowercase,
25 and let's suppose that each of those 26 letters has a

1 different frequency of occurrence, what we call
2 probability, then we could describe how much information
3 content the letters using this probability distribution
4 have, and one measure of that is called the entropy.

5 And this was defined back in the late 1940s.
6 And it's -- there is a specific formula for it where you
7 add up the sum of the probabilities multiplied by the
8 logarithm of the reciprocals of the probabilities. And
9 that's the mathematical definition of entropy.

10 Q. So in a lossless compressor, is the entropy
11 preserved between the compressed representation and the
12 decompressed representation?

13 A. With all due respect, that's a little bit of a
14 nonsensical question because the entropy refers to a
15 random variable, not a specific instance of that random
16 variable. You're asking me whether a specific instance
17 after coding retains the entropy. You would normally
18 ask a question about the entropy of the ensemble or the
19 full collection of letters with their probabilities.

20 Q. Okay. Let me try it a different way. When you
21 compress input data using a lossless compressor, do you
22 preserve all of the information present in the
23 uncompressed data representation in the compressed
24 representation of the data?

25 A. It depends what you mean by that. Generally,

1 the answer is yes, but let me qualify it by explaining
2 why the answer could be no.

3 If you were coding English letters, like in my
4 previous example, into binary -- variable length binary
5 words, you might take the letter G and encode it as,
6 let's say, a five-bit word. You would have all the
7 information content in the binary words in the sense
8 that you could reconstruct the original letters provided
9 you had a mapping, like a table, showing what those
10 letters should be.

11 But from a strictly literal meaning of your
12 question, you lose the actual letters themselves because
13 they become binary, but if you allow me to have a table
14 to decode, then you're not losing information.

15 Q. Now, if we use a lossy compression method,
16 would all the information be preserved between a
17 compression and decompression cycle?

18 A. Generally no, because that's the whole meaning
19 of the word lossy is that you're losing something. And
20 you can't, in general, get back to exactly where you
21 came from the lossy compressed version.

22 Q. Is there a term to refer to the data that is
23 lost, the information that is lost between a compression
24 and decompression cycle using a lossy compressor?

25 A. Not specifically for that, but there is terms

1 that relate to it such as the word "distortion." The
2 word "distortion" refers to -- there is different
3 meanings for it. But one typical meaning is that it's
4 the original input if it were a real value number minus
5 the resulting reconstructed value trying to go from the
6 lossy compressed version backwards. So that when you
7 subtract the two, the difference is how much you've lost
8 in a certain sense and that's the distortion, but we
9 don't usually refer to that as the information lost.

10 Q. So perhaps for the purpose of this question,
11 can we refer for this concept of the information that's
12 lost from compressing it using a lossy compressor,
13 perhaps we can just refer to it as the lost information.

14 A. Well, I prefer not to because that's not the
15 normal way to refer to it.

16 Q. How would you normally refer to it?

17 A. Well, when you say "refer to it," I'm not sure
18 what the "it" is exactly.

19 Q. The information that is lost going from an
20 uncompressed format to the compressed format using a
21 lossy compression.

22 A. It's -- you have to be very, very precise when
23 you ask these questions. So when you say "the
24 information lost," the word "information" actually has a
25 very precise meaning.

1 You asked me about entropy earlier. If you're
2 asking about a question of entropy, before an entropy
3 after that can be one question. Another question could
4 be the distortion between the input and the output. And
5 this is a fundamental pair of numbers that people study
6 is the rate versus the distortion. That's the entropy
7 of the resulting compressed signal versus the
8 distortion. So I'm not really sure what you mean by the
9 information lost.

10 Q. When you take input data and compress it using
11 a lossy compressor, is some data lost in the process of
12 that compression?

13 A. It depends what you mean by "lost." I can
14 definitely say that you cannot get back in general to
15 the original data, but sometimes the word "lost" conveys
16 the notion of disappearing or what we call in the field
17 decimation. It doesn't vanish. It's not lost in that
18 sense. It's lost maybe in a nontechnical sense because
19 of the fact that you can't completely invert the data
20 back to the original.

21 Q. Let me ask you about decimated. When you go
22 from data, you take an input data source, you compress
23 it using a lossy compressor, and then you decompress it
24 using the same algorithm, is the difference between the
25 data that was in the uncompressed format before

1 compression and what is present after decompression,
2 would that be decimated data?

3 A. It could be. That's one example. It's not the
4 only situation.

5 Q. Okay.

6 A. And just to clarify, decimation usually means
7 just throwing away data. So one form of data
8 compression is to take data and throw away some of it,
9 like every second piece of data. That's not the only
10 way you can compress data. That's just an example.

11 Q. In video compression, is there any particular
12 type of data -- type of way to refer to the data that is
13 lost using lossy video compression algorithms?

14 A. Again, usually in this field to people of
15 ordinary skill in the art or even people with
16 extraordinary skill in the art, it's not typical to
17 refer to the lost data in a lossy data compression
18 system. We normally refer to the distortion, which as I
19 explained was the arithmetic difference between the
20 input and the output.

21 Q. So the difference between the original data and
22 the data after you've compressed it and then
23 decompressed it, the difference is referred to as
24 distortion?

25 A. To be precise, if --

1 MR. STONEDALE: Object to form.

2 THE WITNESS: To be precise, if the original
3 data is real value -- and I need to make this
4 distinction because sometimes input data is complex
5 valued or vector valued. There is different options.
6 But if it is real valued and then the reconstructed
7 value after compression and decompression is also real
8 valued, it's typical but not always the case that you
9 subtract them. And usually actually after subtracting
10 it, you typically square that value and take the average
11 of those, and that's what people would call distortion
12 in many cases, but that's certainly not the only way to
13 interpret distortion. It really depends on the specific
14 context of it.

15 BY MR. PONDER:

16 Q. If we take video data and compress it using a
17 lossy compressor and then decompress the data, will the
18 decompressed data be exactly the same as the compressed
19 data?

20 A. Are you -- in your hypothetical, are you
21 assuming that you start with analog or digital input
22 data?

23 Q. Digital video data.

24 A. That's your input?

25 Q. Is the input.

1 A. It depends on what your compressor and
2 decompressor do.

3 Q. If my compressor is using a lossy compression
4 algorithm and it actually does something that is lossy
5 compression, will there be a difference between the
6 picture that is reproduced when it is decompressed?

7 A. Typically there would be --

8 MR. STONEDALE: Object to form.

9 THE WITNESS: Typically there would be a
10 difference in the reconstructed image from the original.
11 Whether or not that's perceivable by a human is another
12 question.

13 BY MR. PONDER:

14 Q. Is there a term used to refer to this concept
15 that there would be a difference in the reconstructed
16 image?

17 A. Well, unless I'm missing something, I think you
18 are just defining or stating what it means to be a lossy
19 compression system.

20 Q. But I'm trying to get to what -- how can we
21 refer to that specific -- those specific differences?

22 A. I'm not sure what you're --

23 Q. So we have the original picture and then we
24 have the reconstituted picture. What term could we use
25 to describe the difference between the original picture

1 and the reconstituted picture?

2 A. If you're talking about video, then there is
3 not a single picture. There is a stream of pictures.
4 So are you focusing on just one of those or the function
5 of time where the pictures keep changing?

6 Q. Well, let's start with just a single picture.
7 Is there a term used to refer to that difference?

8 A. Sometimes -- a relatively common terminology
9 for the difference between an original picture, a single
10 picture, and its reconstructed picture after lossy
11 coding would be the term "residual." So that's not
12 universally used, but it is fairly common.

13 Q. And then if we're talking about some segment
14 of video, so a stream of pictures, is there a term
15 that's used to refer to the collective differences that
16 have been introduced by using a lossy compression
17 algorithm?

18 A. Again, the word "residual," if you maybe said
19 residual video stream, that might be an accurate way of
20 describing it. Most people would understand that to
21 mean the difference between the original and the final.

22 Q. Is the residual -- let's go with the example of
23 a single picture being compressed using a lossy
24 compression algorithm. Is the residual compressed
25 during the process of compression?

1 MR. STONEDALE: Object to form.

2 THE WITNESS: Well, generally -- again, it
3 depends on the context, but generally the residual, for
4 example, would be something like the original minus the
5 final. When I say "final," what I mean is after
6 decompression and reconstruction. So it might be the
7 pixel-by-pixel subtraction of the original and the
8 final. So it would be kind of like an image, but it's
9 not the result of compressing anything. And it itself
10 doesn't get compressed but rather it is literally the
11 original minus the final.

12 BY MR. PONDER:

13 Q. So the residual is information that was present
14 in the original picture that is not in the compressed
15 representation of the original image?

16 A. I wouldn't characterize it that way, because
17 your -- the premise there is that you're saying that it
18 is information in the original image. You'd really have
19 to say what you mean by "information."

20 A residual really is what it is. It's exactly
21 what I said. It's just the original minus the final.
22 You're trying to recharacterize it using different words
23 that are not very accurate.

24 Q. So what would the residual be in the original
25 representation?

1 A. I'm not sure. I don't think it would be
2 something in the original. It's the original minus the
3 final. So it's really not in the original. It may have
4 mathematical correlation with the original so there may
5 be statistical similarities, but I would probably stop
6 at that point.

7 Q. Okay. So this category of algorithms are
8 called lossy. And you agree with me something is lost
9 if people in the ordinary skill in the art are referring
10 to this class of encoder as a lossy compression
11 algorithm; correct?

12 A. Well, to the extent that something is lost, the
13 thing that is lost is the ability to perfectly
14 reconstruct the original data.

15 Q. And the reason why you lose the ability to
16 perfectly reconstruct the original data is because
17 something has been lost. What is that thing that's been
18 lost?

19 A. It's the ability to reconstruct the original
20 data.

21 MR. STONEDALE: Object to form.

22 BY MR. PONDER:

23 Q. Okay. And so you can't provide for the board a
24 simple term for what it is that is lost in the
25 compression process that results in this inability to

1 perfectly reconstruct the original image. There is just
2 no term for this?

3 A. Well, in a lossy compression system, the big
4 picture is you start with data that's represented by a
5 lot of bits and reduce it to data that's represented by
6 less bits. And in the process, you use a mapping or a
7 function that is noninvertible. It's just
8 mathematically that's the best you can say. It's just a
9 noninvertible function.

10 You're trying to characterize that as losing a
11 certain thing. And I'm telling you that it's actually
12 losing a capability, not like an object. You're not
13 losing a bit. You're not losing a color. You're not
14 losing something like that. You're losing a capability,
15 because the mapping is using less bits to represent the
16 original content after compression.

17 Just maybe this would help clarify it. But if
18 you use the example I gave before of the English
19 alphabet where you have 26 letters, if I compressed that
20 down to one bit, I either say zero or one, I think it's
21 pretty clear to everybody that there is no way you're
22 going to figure out which of the 26 letters was
23 originally given this input because the final bit,
24 either zero or one, can only represent two possible
25 things.

1 Q. What do you mean by losing the ability to
2 reconstruct the original data?

3 A. Losing the ability has a very precise meaning,
4 and it means that the encoder mapping is not invertible.
5 Invertible is mathematically the capability of basically
6 going backward and getting the original data. So in
7 mathematics, there is things called functions and there
8 is a notion of an inverse function. And if you have a
9 function and you follow it by an inverse function, if
10 they give the identity function, that's called
11 invertibility from a technical point of view.

12 Q. So when you have a noninvertible function,
13 noninvertible mapping function, it's not fair to say
14 that you've lost some data going through this mapping
15 process from the original to the reconstituted data?

16 A. In general, that's not how it would be
17 described. There are certainly examples where that
18 could be the case like, you know -- I'll give an example
19 again in terms of the alphabet I was previously talking
20 about.

21 If you took the ASCII representation of each of
22 the English letters and threw away the first seven of
23 those bits and just retained the last bit, then you
24 would be reducing the 26 letters down to one bit. And
25 you did it by -- I guess you can say you lost data. You

1 lost the first seven bits, but that's a very contrived,
2 unusual example.

3 Q. So you are saying that a lossy compression
4 algorithm does not partially discard data that is
5 present in the original input?

6 A. It could as in the example --

7 MR. STONEDALE: Object to form.

8 THE WITNESS: It could as in the previous
9 example I just gave about alphabets, but not in all
10 cases is that true.

11 BY MR. PONDER:

12 Q. Now, this data that's been discarded, if it's
13 been discarded, is it your opinion that discarded data
14 has been compressed into the representation, the output
15 representation?

16 A. Well, okay. First of all, in your
17 hypothetical, I think you're asking me about a very
18 extreme unusual case like in the example I gave where
19 you throw away seven of the eight ASCII bits, and you're
20 asking me if -- let me just phrase it in terms of that
21 example so I understand your question.

22 Are you asking me for an example like that,
23 whether the seven bits that were thrown away were
24 themselves compressed?

25 Q. Yes.

1 A. I wouldn't say those seven bits were compressed
2 because they were thrown away, but I might say that the
3 original eight-bit ASCII character was compressed down
4 to one bit.

5 Q. Let's turn back to video and images because I
6 think that's the more common -- let me ask you. Are
7 lossy compression algorithms more commonly used for
8 video and image compression applications?

9 A. More commonly than what?

10 Q. Let me ask a different question. Is it common
11 to use a lossy compression algorithm to compress textual
12 data like your ASCII character example?

13 A. Usually with textual data in many situations,
14 probably most situations, you would not use lossy, you
15 would use lossless, but not 100 percent of the time.

16 Q. Okay. And then turning to video and image
17 applications. Is it more or less common to use a lossy
18 compression algorithm than a lossless compression
19 algorithm?

20 A. These days I have not taken a precise survey,
21 but it's pretty clear that lossy would be more common.

22 Q. When compressing video using a lossy
23 compression algorithm, are you saying that there is no
24 data from the original video representation that is
25 discarded in the compression process?

1 MR. STONEDALE: Object to form.

2 THE WITNESS: I really don't know exactly what
3 you mean by data being discarded. The more normal way
4 that a person of ordinary skill in the art would talk
5 about it or understand it would be that the data is
6 transformed or compressed. They normally wouldn't use
7 the terminology "discarded."

8 BY MR. PONDER:

9 Q. Okay. Now, when you go from the compressed
10 representation to a reconstituted representation, is
11 that transformed data present in the reconstituted
12 representation or is this the part that becomes what you
13 referred to earlier as the residual?

14 MR. STONEDALE: Object to form.

15 THE WITNESS: Again, the question doesn't quite
16 make sense because your question asks about whether data
17 is present in a particular signal, whether it is
18 particularly present in the reconstituted
19 representation.

20 The notion of data being present in something
21 else is not something that's normally talked about or
22 thought about by a person of ordinary skill in the art
23 other than maybe asking is data present in a file or
24 something like that.

25 But usually the notion of data being present in

1 something is outside of the usual discussion. You would
2 normally talk about whether data is compressible,
3 whether compressed data can be reconstructed, and that
4 would determine lossy versus lossless.

5 MR. PONDER: Why don't we go ahead and take a
6 quick five-minute break and let's see where lunch is.

7 (Lunch recess, 11:53 a.m.)
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1 SAN DIEGO, CALIFORNIA

2 WEDNESDAY, JULY 17, 2019, 12:48 P.M.

3
4 MR. PONDER: Let's go back on the record.

5 BY MR. PONDER:

6 Q. Have you heard the term "algorithmic
7 efficiency"?

8 A. I believe that appears in this specification of
9 the '477 patent.

10 Q. Is "algorithmic efficiency" a term that a
11 person of ordinary skill in the art would have been
12 familiar with at the time of the invention?

13 A. I think that's a term that's fairly specific to
14 this patent. It's not a term that was commonly used
15 outside of the '477 patent. I wouldn't say that it
16 was not used at all, but it's fairly particular to
17 this patent, at least in the way that that it's used
18 here.

19 Q. Okay. Before we turn to the specific meaning
20 in the '477 patent, can you describe what the plain,
21 ordinary meaning sense of "algorithmic efficiency" would
22 have been to a person of ordinary skill in the art at
23 the time of the invention?

24 A. Do you mean outside of this patent?

25 Q. Basically what would a person of ordinary skill

1 in the art thought "algorithmic efficiency" meant before
2 they read the '477 patent?

3 A. As I mentioned in the previous answer, I'm not
4 sure that a person would have a precise understanding
5 because the term is not commonly used, at least in the
6 sense of this patent. So I think a person encountering
7 the phrase "algorithmic efficiency" would probably want
8 clarification outside of this patent and would ask
9 somebody, "What precisely do you mean by that?"

10 Q. Okay. And what meaning do you think the
11 '477 patent specifies for "algorithmic efficiency"?

12 A. I'd like to look through the patent to find
13 where it is used. If you remember, you can save me some
14 time.

15 Q. Sure.

16 A. I think it's in column 5 around line 31.

17 Q. Okay.

18 A. So here it -- just in the middle of this
19 sentence, it says, "we define algorithmic efficiency as
20 the time required to achieve a given compression ratio."
21 I think there's other uses of it that may add more
22 understanding.

23 Q. Okay.

24 A. And I also note that I don't believe
25 "algorithmic efficiency" is part of the claim language.

1 Q. In the context of the '477 patent, what does
2 speed mean?

3 A. Could you point to an example of it?

4 Q. Yes. The patent refers to faster and slower.
5 What does faster and slower mean in the context of the
6 '477 patent?

7 A. Are you referring to claim language or in the
8 specification? Because I think --

9 Q. Column 1. I think it's used in the claim
10 language. I think faster and slower is in claim
11 language, but also I think column 1 talks about speed.

12 A. Well, there is an example in column 1 at
13 line 49 of the word "faster." In that context, what
14 they're talking about is, I believe, a lossless data
15 compression system. This is in the description of the
16 related art in the backgrounds. It's not really in the
17 description of the invention.

18 But they're talking about how if you compare
19 the compression ratio of a lossless compressor to the
20 speed of operation, how quickly the compressor
21 functions. Then it's noting that if you want to get
22 more compression, basically you have to take more time
23 to do it. That's the gist of it.

24 They're noting that, for example, if you use a
25 smaller dictionary in a dictionary compressor, then you

1 can get faster compression time because there is less
2 searching and pattern matching that needs to go on.

3 Q. In this example here, they're talking about an
4 example of Lempel-Ziv dictionary-based compression
5 algorithm; is that correct?

6 A. Well, up at line 41, it says, "For example,
7 with a typical dictionary-based compression algorithm
8 such as Lempel-Ziv," yes, and then that discussion
9 continues to where I was. So, yes, it is about
10 Lempel-Ziv.

11 Q. So you agree Lempel-Ziv is a dictionary-based
12 compression algorithm?

13 A. That's correct.

14 Q. When implementing a Lempel-Ziv algorithm, is
15 one design choice the size of the dictionary?

16 A. Yes.

17 Q. Why does the size of the dictionary matter?

18 A. The size of the dictionary is directly related
19 to the ability to find matching patterns, so the larger
20 the dictionary is, the more patterns that can be stored
21 and the longer patterns can be stored. And this can
22 give rise to improved compression, which means better
23 compression ratios, so larger compression ratios in
24 particular.

25 So to summarize that, the size of the

1 dictionary is directly related to the compressibility,
2 but it's also directly related to how long the search
3 time is and what the computation involved is. So there
4 is a trade-off between the work effort and the quality
5 of the compression.

6 Q. So does a dictionary contain mappings of data
7 to the compressed representation?

8 A. Generally dictionary -- there's different ways
9 of implementing it, but a typical way is for
10 dictionaries to contain patterns.

11 Q. And what is a pattern in the context of binary
12 data?

13 A. A pattern could be a string, a binary string.

14 Q. So in a dictionary for a given pattern, what is
15 it at kind of like a high level? Is it if you have a
16 key and a -- what the compressed representation should
17 be?

18 A. A pattern is a string of zeros and ones of
19 finite length that typically represents a pattern that
20 occurs hopefully frequently in the text being
21 compressed. And the idea is that if you can locate that
22 pattern in future input binary data, then instead of
23 individually coding all of the bits of that input
24 pattern, you can refer to its location in the dictionary
25 and that winds up giving you compression.

1 Q. So if you have a larger dictionary, does that
2 mean that each time you want to compare the data to be
3 compressed, there is -- if it is a larger dictionary,
4 there's more entries to check?

5 A. Yes.

6 Q. So in that instance, the larger dictionary has
7 the penalty of additional computation time when
8 performing the -- kind of the matching step in the
9 compression phase?

10 A. That's one of the penalties. There is also a
11 memory or space penalty.

12 Q. In that it takes longer to implement the
13 algorithm if it has to check more memory locations?

14 A. No. That you need more storage.

15 Q. How does that impact upon the speed of the
16 dictionary-based compression scheme?

17 A. I don't think the storage factor would have
18 much or any of an impact on the speed. It would be more
19 that there are just more things to search. So in that
20 respect, it would have an impact. But I was just
21 pointing out that the storage is another penalty.

22 Q. Does a large -- a relatively larger dictionary
23 yield better compression ratios?

24 A. As a general principle, yes. There is a
25 relationship between, in Lempel-Ziv, the size of the

1 dictionary and the ultimate performance of the
2 compressor, specifically being that the larger the
3 dictionary, generally the better the compression, so
4 that means higher compression ratios.

5 Q. Why does having a relatively larger dictionary
6 yield better compression ratios?

7 A. Well, it's -- without getting very
8 mathematical, which would take a while, the general idea
9 is that you can store more patterns in a larger
10 dictionary and you can store longer patterns, and long
11 patterns generally are what gives you good compression.

12 Q. If execution speed is more important than
13 compression ratio, should a POSITA use a smaller
14 dictionary or a larger dictionary?

15 MR. STONEDALE: Object to form.

16 THE WITNESS: I kind of dispute the premise
17 because it's never really the case that one thing is
18 more important than the other. You have to weigh the
19 benefits versus the expenses or the negative aspects to
20 it. So a person of ordinary skill in the art wouldn't
21 just say, "Well, it's more important to have a better --
22 a bigger dictionary." You would have to weigh that
23 against the downside and make an informed decision of
24 the pros and the cons.

25 ///

1 BY MR. PONDER:

2 Q. So it is not possible that a POSITA would
3 conclude that for the particular problem they're trying
4 to solve that optimizing execution speed is more
5 important than reducing or increasing the compression
6 ratio?

7 A. Well, it could be that the trade-off between
8 execution speed and compression ratio is lopsided in
9 one direction. It could be that the execution speed is
10 more important or the dictionary size is more important.
11 But it's typically not all or nothing.

12 Typically there is some balance, and you can
13 quantify that balance and that's what a person of
14 ordinary skill in the art would do. They would weigh
15 the pros and the cons, taking into account the
16 importance of each, but it would be very unusual and
17 probably not the case that one of them could be
18 completely disqualified and ignored.

19 Q. So you disagree that as a general principle
20 that a POSITA could conclude that execution speed is
21 more important than compression ratio and they should
22 use -- strike that.

23 You refer to balancing pros and cons. What did
24 you mean as far as pros and cons? What were you
25 referring to?

1 A. Well, an example in what we were just talking
2 about, a pro might be the fact that a larger dictionary
3 could get better compression and thus a higher
4 compression ratio. That would be a pro in the sense
5 that you could compress better and maybe save storage on
6 a disc, for example, and ultimately money if you're
7 saving on disc space.

8 A con that's associated with that would be the
9 downside that you have a larger dictionary and that
10 could require more time to search or more storage
11 requirements, things like that.

12 So depending on the application in mind, a
13 person of ordinary skill in the art that wanted to
14 practice a particular invention involving this kind of
15 trade-off would have to weigh the different values of
16 those pros and cons. And maybe the pros save a certain
17 amount of money and maybe the cons wind up adding a
18 certain amount of money. So maybe what they want to do
19 is take the pluses and the minuses and find the net gain
20 or the net loss and see if it's worth it.

21 Q. So is one of the considerations the amount of
22 storage that would be required to implement one versus
23 the other as far as compression algorithms?

24 A. You're asking kind of a hypothetical with not a
25 whole lot of specifics. But just as a general

1 principle, if a person of ordinary skill in the art had
2 two pieces of art, say two inventions, and they thought
3 about the possibility of combining them, I don't think
4 they would consider it -- they wouldn't have a
5 motivation to combine them without properly considering
6 the pluses and the minuses, the benefits versus the
7 negative aspects of combining them.

8 They wouldn't just say that, "Oh, combining
9 them is good because it adds this feature." They would
10 have to weigh that against the downsides brought upon
11 them by combining them.

12 Q. To go back to the question of how you choose
13 between different compression algorithms and deciding
14 which -- deciding whether to have a compression
15 algorithm that has a higher compression ratio versus one
16 that has a faster execution speed, what are some of the
17 considerations that a POSITA would find relevant to
18 making that determination?

19 A. Are you talking about in a particular --

20 MR. STONEDALE: Object to form.

21 THE WITNESS: Are you talking about in a
22 particular disclosure or the '477 patent or some prior
23 art? What's the setup here?

24 BY MR. PONDER:

25 Q. I mean, I think we're talking about kind of the

1 example that gives us of, you know, when execution speed
2 might be more important than compression ratio. I'm
3 trying to understand why -- what are the considerations
4 a POSITA would look to in deciding whether achieving a
5 faster execution speed is more important than achieving
6 a higher compression ratio.

7 A. Okay. So I think what you're saying is in the
8 context of this example about Lempel-Ziv in column 1 of
9 the '477 patent somewhere between lines 40 and 50,
10 roughly, in that context, that's a situation where the
11 patent is disclosing that there is a -- some kind of
12 trade-off between speed on one hand and the size of the
13 dictionary on the other hand.

14 So the types of considerations that a person of
15 ordinary skill in the art would consider is whether or
16 not the changes that would occur by choosing one over
17 the other -- for example, by choosing a larger
18 dictionary, what are the changes that that would incur
19 on a system.

20 Well, as I mentioned, that would incur perhaps
21 better quality compression. That would be a good thing.
22 But on the other hand, it would introduce perhaps more
23 search time and more storage requirements. That would
24 be potentially a bad thing.

25 So a person of ordinary skill would have to

1 decide whether the goods outweigh the bads.

2 Q. Okay. You referred to better quality
3 compression. What did you mean by "better quality
4 compression"?

5 A. Well, I'm specifically referring to compression
6 ratio as we discussed before.

7 Q. Do persons of ordinary skill in the art refer
8 to compression ratio when deciding -- strike that.

9 Would a person of ordinary skill in the art use
10 compression ratio as an indicator of better quality
11 compression?

12 A. For a lossless compression system --

13 MR. STONEDALE: Object to form.

14 THE WITNESS: Let me start my answer over.

15 So for a lossless compression system, the
16 compression ratio is certainly the primary measurement
17 of the quality of the compression. It's not the only
18 consideration, of course, because there's things like
19 execution time and storage that I've been talking about.

20 MR. PONDER: Let's pause for a moment.

21 (Pause in proceedings.)

22 MR. PONDER: Let's go back on the record.

23 BY MR. PONDER:

24 Q. What are other considerations aside from
25 execution time and storage that would be relevant to

1 determining whether a lossless compression algorithm is
2 better compression quality -- achieves better
3 compression quality?

4 A. Better than what?

5 Q. Well, I'm asking you because you said better --
6 you used the term "better quality compression" and then
7 you mentioned that compression ratio isn't the only
8 measurement for determining quality compression and then
9 you mentioned execution time and storage.

10 So I'm just trying to understand what are all
11 the potential measurements that feed into making a
12 determination of whether a lossless compression
13 algorithm achieves better compression, better quality
14 compression?

15 A. But I'm not sure what you mean by -- better
16 than what? I didn't say "better," I don't think, in my
17 answer. If I did, remind me.

18 Q. You did back at 13:07:34.

19 A. Can you just read me what I said?

20 Q. You said, "Well, as I mentioned, that would
21 incur perhaps better quality compression."

22 A. Oh, okay. In that context, I was referring to
23 a bigger dictionary being better than a smaller
24 dictionary.

25 Q. And then I was kind of, after that, asking you

1 do persons of ordinary skill in the art at the time of
2 the invention, would they have used a phrase such as
3 "better quality compression"?

4 A. I think I need to timeout because my video
5 link -- something popped up here.

6 Joel, are you still there?

7 MR. STONEDALE: Yeah. I've lost you. I can't
8 see you anymore or you're very still.

9 MR. PONDER: Let's go off the record.

10 (Pause in proceedings.)

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

12 BY MR. PONDER:

13 Q. What would a POSITA understand the term "better
14 quality compression" to mean at the time of the
15 invention for a lossless compression system?

16 A. That's not something I specifically construed
17 for the purpose of this IPR. However, generally
18 speaking, I think if a person of ordinary skill in the
19 art heard the phrase "better quality lossless
20 compression," they would most likely think about the
21 compression ratio of a particular lossless coder.

22 And the point is that the word "quality" there
23 is specifically referring to the compression ratio.
24 Now, that doesn't mean that there aren't other
25 considerations like I talked about before, speed and

1 storage, but those probably wouldn't fall under the
2 category of quality.

3 Q. And a better quality lossless compressor would
4 have a higher compression ratio than the not-as-good
5 lossless compression coder?

6 MR. STONEDALE: Object to form.

7 THE WITNESS: I think that's generally correct,
8 although I'll point out that I'm using these
9 terminologies a little bit loosely because whether
10 somebody calls something better quality or not, you
11 know, is a hypothetical. And it's probably true that
12 people refer to them that way sometimes, but it's
13 certainly not claim language here.

14 BY MR. PONDER:

15 Q. If in a dictionary-based compression algorithm
16 a smaller dictionary is used, is the advantage that the
17 compression speed is faster but likely to achieve a
18 lower compression ratio?

19 MR. STONEDALE: Object to form.

20 THE WITNESS: If the compression speed is
21 measured in terms of how long it takes the compressor to
22 compress, let's say in CPU cycles or seconds, then what
23 you said is generally correct.

24 BY MR. PONDER:

25 Q. How does a compression rate relate to

1 compression ratio?

2 A. Well, they're two different things. As we
3 discussed before, compression rate is -- it's mentioned
4 in column 1 of the '477. It's also discussed in my --
5 paragraph 36 of my declaration. I think Dr. Storer
6 actually more or less agrees with what's there. I
7 remember in his report it said something very, very
8 similar.

9 And in contrast, compression ratio has to do
10 with how much the data is compressed. It really doesn't
11 have to do at all with how long it takes to get the job
12 done.

13 So one of them has to do with timing and the
14 other has to do with reducing the amount of data or how
15 much data is reduced.

16 Q. So is it your opinion that there is no -- there
17 is no established relationship between compression rate
18 and compression ratio?

19 A. Well, there may be --

20 MR. STONEDALE: Object to form.

21 THE WITNESS: There may be a relationship, a
22 relationship that, for example, the more time that is
23 spent doing compressing, as a general principle, often
24 gives better compression, but it's not a strict
25 mathematical formula relating the two. And it's

1 entirely possible that you could have either a direct
2 relationship or an inverse relationship. So it's not
3 really possible to predict one from the other.

4 BY MR. PONDER:

5 Q. So if a compression algorithm takes more
6 time -- spends more time doing the compressing, would
7 that be a relatively slower compression rate?

8 A. It really depends because, you see, with lossy
9 compression, for example, you could incur some loss or
10 what we call distortion, and then you can pretty much
11 compress any amount you want if you're willing to pay
12 the price in getting a lot of distortion, and then the
13 compression rate could be something else.

14 So the example given in column 1 here of the
15 '477 has to do with lossless compression, but in the
16 lossy compression case, there could be all sorts of
17 different combinations of compression rate and
18 compression ratios that can occur depending on what the
19 distortion is.

20 Q. So I'm trying to understand your answer at
21 13:16:51. The first sentence you said there, "There may
22 be a relationship, a relationship that, for example, the
23 more time that is spent doing compressing, as a general
24 principle, often gives better compression."

25 What I want to understand about that statement

1 is what does it mean to spend more time doing
2 compressing?

3 A. Well, first let me qualify that that answer I
4 gave was primarily for lossless compression. It could
5 potentially apply to lossy compression if one were
6 to fix the amount of distortion. But when distortion
7 is a variable, then that statement probably would not
8 hold.

9 So what -- your question was: What does it
10 mean to spend more time doing compressing. I use that
11 in a rough sense. What I mean by that is basically have
12 more CPU cycles involved in completing the process of
13 compression. And a good example of that would be in
14 this column 1, Lempel-Ziv example we talked about before
15 where, with a larger dictionary, if more time is spent
16 because of the larger dictionary, you might achieve a
17 higher compression ratio.

18 Q. Okay. Well, let's -- for this question, let's
19 stick with just the lossless compression. If a lossless
20 compression algorithm spends more time doing
21 compression, would that be an example of a faster or
22 slower compression rate?

23 A. Well, I don't think you could say either
24 because the compression rate -- again, if I refer to --
25 I'll go back to my paragraph 36 from Exhibit 2002A,

1 where I am again pointing out the construction of data
2 compression rate used by the petition and also stated in
3 Dr. Storer's expert report that it's measured by the
4 amount of input data that it can compress per unit of
5 time at a given compression ratio.

6 So it's not really connected to what you just
7 asked.

8 Q. Okay. So let's take that definition of
9 compression rate. If you have a certain amount of input
10 data and you use a -- you have two different compression
11 algorithms that achieve the same compression ratio,
12 applying that definition, do both of those compressors
13 have the same compression rate?

14 A. Well, you left out one fact, which is the per
15 unit of time. That's part of the definition. So you
16 didn't tell me how much time each of them spends doing
17 that. If both of them spent the same amount of time,
18 then I think the answer would be yes to your question.
19 If one of them spent twice as much time as the other
20 doing that, then the answer would be no.

21 Q. And is it your position that there is no
22 generally accepted relationship between a compression
23 rate and a compression ratio for a lossy compression
24 algorithm?

25 MR. STONEDALE: Object to form.

1 THE WITNESS: Just to be clear, the words that
2 you're using, I should understand them in the context of
3 the '477 usage of those?

4 BY MR. PONDER:

5 Q. Yes.

6 A. I don't think that there is a direct way, for
7 example, to calculate the compression rate from the
8 compression ratio for a lossy compression algorithm
9 without knowing how much time they take to do the
10 compression. So the way you asked the question, I think
11 I would say there is no general relationship.

12 Q. Well, I think you answered a different question
13 perhaps, because you referred to calculating. And I'm
14 asking kind of, I think, a simpler question. So let me
15 ask it one more time.

16 Is it your position that there is no generally
17 accepted relationship between a compression rate and a
18 compression ratio for a lossy compression algorithm,
19 giving compression rate and compression ratio the
20 meaning given to those terms by the '477 patent?

21 A. Well, I think my answer is pretty close to
22 my --

23 MR. STONEDALE: Object to form.

24 THE WITNESS: I think my answer is pretty close
25 to my previous one, and I can leave out the word

1 "calculating" if I qualify it because -- let me try to
2 answer it with an example. In fact, the example that
3 you gave before would probably suffice, where you have
4 two compression algorithms that have the same
5 compression ratio -- and I forgot the rest of your
6 parameters.

7 But basically depending on how much time they
8 take to perform the compression, virtually any
9 compression rate could be achieved. If one of them
10 takes almost zero time and the other takes almost
11 infinite time, there's a huge spectrum of different
12 compression rates that could be achieved.

13 So your question about whether there is a
14 general relationship between the two would be no unless
15 something is understood about how long they take to
16 perform the compression.

17 Q. Okay. I'm going to ask you a similar question
18 but with respect to a lossy compression algorithm. Is
19 it your position there is no generally accepted
20 relationship between a compression rate and a
21 compression ratio for a -- strike that because I messed
22 up lossless and lossy because I already asked you lossy.
23 Let me go back and start this one again.

24 Is it your position there is no generally
25 accepted relationship between a compression rate and a

1 compression ratio for a lossless compression algorithm,
2 giving compression rate and compression ratio the
3 meanings those terms have in the '477 patent?

4 A. I think I can answer this in a similar manner
5 through an example. If you had two compression
6 algorithms and they both compressed at the same ratio --
7 to be definite, let's just say 2 to 1 -- and one of them
8 performed this compression in, let's say, one second,
9 then depending on how much time it takes the other one
10 to perform the compression, virtually any compression
11 rate could be achieved for the second one, and thus
12 there really is no general relationship that you could
13 establish ahead of time between these two algorithms
14 without knowing how long or how much time they spend
15 performing these compressions.

16 Q. So giving me your answer, you gave an example
17 of where it wouldn't be possible to determine a
18 relationship between the compression rate and the
19 compression ratio for a lossless compressor. Is that
20 fair?

21 A. I was responding to your question about a
22 generally accepted relationship. And by giving you an
23 example where there is not, that would give the
24 counterexample to a generally accepted relationship.

25 Q. So are you taking the position that there is a

1 generally accepted relationship or is there no generally
2 accepted relationship?

3 A. Well, by providing a counterexample, I'm
4 demonstrating that there is not a generally accepted
5 relationship if you don't know anything about how much
6 time it takes.

7 Q. Okay. So for both lossless and lossy
8 compression algorithms, you have provided examples of
9 where it's not possible to determine a relationship
10 between compression rate and compression ratio; correct?

11 A. Without knowing the time of --

12 MR. STONEDALE: Object to form.

13 THE WITNESS: Without knowing how much time it
14 took to perform the compressions, there is not a general
15 relationship in either case.

16 BY MR. PONDER:

17 Q. Have you heard of the term "output rate"?

18 A. Yes.

19 Q. Is that a term that POSITAs would have used at
20 the time of invention?

21 A. I think that's a fairly common term that
22 generally refers to typically how many bits are coming
23 out of a component of a -- let's say a compression
24 system in this context. So if you had a compressor and
25 there was an input and there was an output and the

1 output had data coming out at one megabit per second, it
2 would be typical to describe that as an output rate, the
3 one megabit per second.

4 Q. So in that instance, you refer to an amount of
5 data per unit time. What is the time period that's
6 being measured there?

7 A. When you talk about data per time, that's a
8 rate of change or a -- sometimes in physics we call it
9 velocity. There is not a duration of time. It's a
10 speed. You could -- if you wanted, you could say what's
11 the rate over a certain amount of time, but that's not
12 really how you normally would say it.

13 Q. So having an output rate doesn't tell you how
14 much time it takes to compress data?

15 A. Well, if you knew the amount of data at the
16 input and you knew the data -- or the output rate, if
17 you knew more information, you could calculate it.

18 Q. When you refer to, say, a video compression
19 algorithm such as MPEG, are there any well-known output
20 rates associated with MPEG?

21 A. Yeah. There is -- in the standard, there's a
22 set of different typical output rates that one can
23 select from.

24 Q. Do you remember any of the typical output rates
25 that you can select from for MPEG?

1 A. I don't remember all the specific numbers, but
2 they're usually given as integer multiples of megabits,
3 hundreds of kilobits, things like that.

4 Q. Is one megabit approximately one of the
5 integer -- strike that.

6 Is one megabit one of the output rates in MPEG
7 or close to one of the ones?

8 A. I don't remember the specific numbers offhand,
9 but that -- there's a wide range from -- it certainly
10 goes above that.

11 Q. In those output rates that can be selected in
12 the MPEG standard, what does that output rate mean?

13 A. Well, if -- let's just use your hypothetical
14 one megabit and let's pretend that that's an output
15 rate. If that were an output rate, that would mean that
16 that's how many bits per second are emerging from the
17 encoder. So if you had, as an example, an encoder and a
18 decoder that were separated -- let's say they were in
19 different cities -- you might take that output rate of
20 one megabit per second and transmit it through the
21 Internet or over an antenna and that would be the number
22 of bits per second that would have to go from the
23 encoder to the decoder, wherever it is located, in order
24 to convey the information.

25 Q. How does the output rate relate to the speed

1 necessary for realtime reproduction of an MPEG-encoded
2 video stream?

3 MR. STONEDALE: Object to form.

4 THE WITNESS: Just to be clear, when you say
5 "realtime," you're not referring to one of the parties
6 in this IPR?

7 BY MR. PONDER:

8 Q. No.

9 A. So it depends a little bit on what you mean by
10 "realtime reproduction." It depends what the input is
11 and what the output represents. So the word "realtime"
12 usually refers to a system that keeps up with a source
13 that is live.

14 So as an example, you might have a video system
15 that has a camera of a person like, for example, in
16 Skype. That's a good example. And a realtime system
17 would be such that the combined encoding and decoding
18 allows the recipient of the Skype conversation -- let's
19 say the second person involved in it -- to see the first
20 person more or less as they talk and do things. So they
21 don't have a substantial delay. That's the main idea
22 behind realtime.

23 So in your question, I'm not exactly sure what
24 you mean by realtime there because I didn't see the full
25 setup of the question.

1 Q. Let's take the example of Skype. Have you seen
2 in applications like that where you're asked to select
3 the output rate for the connection?

4 MR. STONEDALE: Object to form.

5 THE WITNESS: Well, when you say the "output
6 rate," are you referring to the bit rate of the data
7 that's leaving one person's Skype connection and then
8 traveling through the Internet to get to the other
9 person?

10 BY MR. PONDER:

11 Q. Sure.

12 A. And you're asking whether I've seen a way to
13 select that rate?

14 Q. Yes.

15 A. I don't recall in Skype if you're allowed to do
16 that. I think Skype has some options where if you
17 actually pay more money or pay some money, they may give
18 you a better connection, which probably involves a
19 higher output rate. But I personally have never -- I
20 use Skype a lot and I have never made a choice between
21 different output rates.

22 Q. Have you ever accessed a live video stream from
23 a website like CNN?

24 A. I have accessed it in the sense I've gone to
25 the website, I've clicked on it and I've downloaded it

1 to my computer and watched it, yes.

2 Q. So have you seen or used the live streaming
3 functionality on, say, a news website like CNN?

4 A. I have used it in the sense I've watched it.
5 Is that what you mean?

6 Q. Yes. Do you remember back ten years ago when
7 you would visit such a site and they'd present you
8 with that box that would say, "What's your connection
9 speed?"

10 A. I don't recall CNN doing that.

11 MR. STONEDALE: Object to form.

12 BY MR. PONDER:

13 Q. Have you ever used -- do you remember RealAudio
14 or RealVideo?

15 A. Yeah.

16 Q. And Microsoft Windows Streaming, are you
17 familiar with that product from ten years ago?

18 A. I don't recall the details. I probably used
19 it, but that was a while ago.

20 Q. Do you remember those applications would ask
21 you to indicate your connection speed?

22 A. Are you referring to when there were acoustic
23 modems, not like cable modems?

24 Q. They had them with cable modems, but that was
25 that early time when we all didn't have great high-speed

1 Internet connections and there would be a wide
2 disconnect. It would let you choose between ISDN and
3 maybe T1 or a cable modem.

4 A. I actually don't remember being asked to
5 choose. I think it was more of an automated procedure
6 when I've done it. Maybe it is more than ten years ago.

7 Q. Do data compression algorithms have associated
8 data compression rates?

9 A. Well, you could use a data compression
10 algorithm at a particular data compression rate.

11 Q. So if you have a particular data compression
12 algorithm, there is no fixed data compression rate
13 that's achieved by that algorithm?

14 MR. STONEDALE: Object to form.

15 THE WITNESS: I don't think in general -- this
16 is just a general statement. It may not be true in
17 every case. But generally speaking, I think the choice
18 of the data compression rate would depend on how much
19 input data you're compressing per unit time. So that's
20 something under your control even for the same
21 algorithm.

22 BY MR. PONDER:

23 Q. Does a data compression algorithm have an
24 associated data compression ratio?

25 MR. STONEDALE: Object to form.

1 THE WITNESS: That depends a little bit on
2 terminology. So it depends kind of what you call an
3 algorithm. Sometimes families of algorithms are just
4 referred to by the singular algorithm. So one specific
5 algorithm generally would have a particular compression
6 ratio for it.

7 However, it is often the case that an algorithm
8 has a parameter that lets you adjust the compression
9 ratio. So in that sense, you could say the algorithm
10 can operate at different compression ratios. So it
11 really depends on what you mean by the question.

12 BY MR. PONDER:

13 Q. Let me just put in front of you Exhibit 1028,
14 which is our table of different compression algorithms.
15 Do you see the list of data compression algorithms that
16 we have on that table?

17 A. Yes.

18 Q. Do any of the data compression algorithms in
19 this table have an associated compression ratio?

20 A. Well, as far as I can see, I'm pretty sure all
21 of them, or at least almost all of them, allow multiple
22 data compression ratios.

23 Q. When compressing data with a particular data
24 compression algorithm, is the compression ratio fixed?

25 A. When you say "fixed," over what duration of

1 time are you referring?

2 Q. Let's say the file's sufficiently large that it
3 has to be broken into segments and you wish to use a
4 single compression algorithm to compress the whole file.
5 Will the compression ratio of each segment of the file
6 have the same compression ratio?

7 A. That's really a design question. A person of
8 ordinary skill in the art using a particular
9 algorithm -- like as an example, let's use Lempel-Ziv
10 since we were talking about that before. A person who
11 wanted to compress a very large file as you indicated
12 using Lempel-Ziv might make the decision to use the same
13 compression ratio for the entire file.

14 On the other hand, a person could equally well
15 have different dictionary sizes and decide to compress
16 some of the segments with one dictionary size and some
17 with another depending on what resources are available
18 and for whatever other reason they have.

19 Q. Is the compression ratio achieved by the
20 algorithm determined solely by the compression algorithm
21 or does it rely on the input data to the compressor?

22 A. Well, there's two different issues there. So
23 the first issue is: Is it determined solely by the
24 algorithm. Just to clarify, an algorithm typically
25 would have a parameter that lets you choose a

1 compression ratio if it can compress at multiple ratios.
2 So in that sense, there's a choice.

3 The second part of the question is: Does it
4 depend on the data. It could very well depend on the
5 data. If you had -- again, a Lempel-Ziv example. With
6 a Lempel-Ziv compression algorithm, if very compressible
7 data went into it, you would get much higher compression
8 than if more random-looking data went into it.

9 Q. So let's say we have two input data sets and
10 the first input data set is more random than the second
11 data set. Okay. Let's assume we have an implementation
12 of a compression algorithm and we apply it using all the
13 same parameters to both the first and second input data
14 sets. Would the compression rate that's achieved on the
15 output be -- of the output be the same for both data
16 sets?

17 MR. STONEDALE: Object to form.

18 THE WITNESS: I would say the answer is not
19 necessarily. But loosely speaking, that would probably
20 happen typically for many types of compression
21 algorithms, but it really depends how you implement it
22 and what you mean by more random, things like that.

23 BY MR. PONDER:

24 Q. So is it your opinion that a compression
25 algorithm, when applied to a single -- strike that.

1 So is it your position that a given compression
2 algorithm, fully implemented with all the parameters
3 set, when applied to two different input data sets will
4 achieve the same compression ratio for both data sets?

5 MR. STONEDALE: Object to form.

6 THE WITNESS: The answer is it might and it
7 might not. It really depends.

8 BY MR. PONDER:

9 Q. What are some of the reasons why it -- well,
10 strike that.

11 Does a compression algorithm that has a slower
12 data compression rate achieve a higher or lower
13 compression ratio, generally speaking?

14 A. Higher or lower than what?

15 Q. Strike that question.

16 Let's go ahead and take a break.

17 (Recess, 1:47 p.m. to 2:08 p.m.)

18 BY MR. PONDER:

19 Q. So referring back to dictionary-based
20 compression. Do you agree that dictionary-based
21 compression has a lower algorithmic effectiveness than
22 arithmetic coding?

23 MR. STONEDALE: Object to form.

24 THE WITNESS: You're using the phrase
25 "algorithmic effectiveness" as used in the '477 patent?

1 BY MR. PONDER:

2 Q. Yes.

3 A. Okay. Let me review that patent.

4 Does this question concern a specific portion
5 of the patent?

6 Q. I don't believe so.

7 A. Well, first let me address the notion of
8 algorithmic effectiveness that was in your question.
9 That's discussed in column 5 of the '477 patent around
10 line 25, where it says, "Within the current art, there
11 are also presently" -- I'm sorry. Let me read that
12 again.

13 "Within the current art, there also presently
14 exists a strong inverse relationship between achieving
15 the maximum (current) theoretical compression ratio,
16 which we define as algorithmic effectiveness, and
17 requisite processing time."

18 So in other words, algorithmic effectiveness
19 here is being explicitly defined. Although it is not a
20 claim language as far as I remember, it's being defined
21 in column 5 as the maximum theoretical compression
22 ratio.

23 And your question was whether dictionary-based
24 compression has a lower algorithmic effectiveness than
25 arithmetic coding.

1 I think that probably -- first of all, I have
2 not offered a specific opinion about that in my
3 declaration, so I don't have an opinion right now as
4 exactly to the answer. But offhand, I think the answer
5 is that it might depend on what the particular data is
6 that's being compressed. I would have to think about
7 that some more.

8 BY MR. PONDER:

9 Q. Would a POSITA have expected that a
10 dictionary-based compression algorithm would have a
11 faster execution speed than an arithmetic compressor?

12 A. So there is some discussion about that in the
13 patent where it's talking about the burden of arithmetic
14 coding in terms of complexity. Do you happen to know
15 where in the patent it is? Or I can look for it.

16 Q. I'm not really certain, and I'm actually asking
17 broader than the patent. I'm kind of curious to know
18 what a POSITA would have expected at the time of the
19 '477 patent, not necessarily based upon the teachings of
20 the '477 patent.

21 A. Well, as I remember, reading the patent, it
22 gave a fairly accurate statement, so I was thinking that
23 would be a good way to start.

24 Q. Maybe it's where they talk about Lempel-Ziv on
25 column 1?

1 A. It could be.

2 Q. I don't think it's there.

3 A. Let me just look, because there was a cite I
4 made to that and I'd like to find it.

5 Yeah. If -- look at the '477 patent in
6 column 5. At around line 11, there is a paragraph that
7 begins with the sentence, "Of popular compression
8 techniques, arithmetic coding possesses the highest
9 degree of algorithmic effectiveness, and as expected, is
10 the slowest to execute." So I'm not sure if that
11 answers your question or not.

12 Q. So would a POSITA have expected that a
13 dictionary-based compression algorithm would have a
14 faster execution speed than an arithmetic compression
15 algorithm?

16 A. I think as a general principle, yes.

17 MR. STONEDALE: Object to form.

18 THE WITNESS: Actually, I'm sorry. Let me back
19 up. I think I misspoke.

20 You mentioned execution speed. So again, it
21 depends what we mean by execution speed. We discussed
22 that before where there's different meanings of that,
23 and -- but generally speaking, the arithmetic coding
24 would be expected to take longer to --

25 ///

1 BY MR. PONDER:

2 Q. Perform the algorithm?

3 A. -- perform its calculation than
4 dictionary-based.

5 Q. Let's talk about the Imai reference. Do you
6 agree that the Imai reference teaches a plurality of
7 different asymmetric data compression encoders?

8 A. Could I have a copy of it?

9 Q. Handing you what has been previously marked in
10 the 1187 IPR as Exhibit 1005. Do you recognize this to
11 be the Imai reference that's discussed in your
12 declaration?

13 A. Yes.

14 Q. So I'll just go back to -- the pending question
15 was: Do you agree that Imai teaches a plurality of
16 different asymmetric data compression encoders?

17 A. I think as we discussed before, I didn't offer
18 an opinion as to which coders were asymmetric or
19 symmetric beyond -- I gave two examples of Lempel-Ziv
20 and Huffman. And I don't recall if either of those were
21 part of Imai's disclosure.

22 Q. Do you agree that Imai teaches a plurality of
23 compression encoders?

24 A. Well, Imai talks about more than one data
25 compression encoder, so I think the answer is yes to

1 that.

2 Q. Does Imai teach having a plurality of
3 compression encoders where each are different
4 compression algorithms?

5 MR. STONEDALE: Object to form.

6 THE WITNESS: I think that's fair to say.

7 BY MR. PONDER:

8 Q. Do you have an opinion as to whether Imai
9 discloses compression algorithms that are asymmetric
10 data compression algorithms?

11 A. I don't recall if Imai discloses Lempel-Ziv,
12 and I think that's the only one that I've really offered
13 an opinion about being asymmetric. So to that extent,
14 assuming Lempel-Ziv is not in there, then I believe the
15 answer is I don't have an opinion about that.

16 Q. Does Imai teach varying the compression encoder
17 in order to meet the throughput of a communications
18 channel?

19 A. Is that a sentence from my declaration, from
20 Imai or something like that? If you could point me to
21 something, I could --

22 Q. It's not a sentence out of your declaration or
23 from the Imai reference. I'm just asking you generally
24 about the teachings, if you agree that it has it or does
25 not have it.

1 MR. STONEDALE: I'm sorry. Harper, I missed
2 what the question was. What was the phrase you were
3 asking about?

4 BY MR. PONDER:

5 Q. Let me ask it again.

6 Does Imai teach changing the compression
7 encoder in order to meet the throughput of a
8 communications channel?

9 A. I'm not really sure specifically what you mean
10 by the word "meet" there.

11 Q. Okay. Does Imai teach changing the compression
12 encoder when the throughput of a communications channel
13 changes?

14 A. I'm looking through Imai to try to verify the
15 answer to that. If there is a place you can point me
16 to, we can speed it up.

17 Q. Maybe paragraphs 146, around there.

18 A. Yeah. I think the answer is effectively yes to
19 your question.

20 Q. How is the throughput of a communications
21 channel typically measured?

22 A. It's a difficult question in general because a
23 communication channel could consist of a network with
24 many inputs and many outputs. If you are referring
25 to -- let me ask you a question. Are you referring to a

1 point-to-point communication channel?

2 Q. I think I'm referring to, say, a communications
3 channel between the encoder -- the encoding system in
4 Imai and the client system in Imai.

5 A. So basically just two users, an encoder and a
6 decoder. In the context of, let's say, the '477,
7 throughput refers to how much flow of data there is.

8 Q. Does Imai teach different ways that the
9 throughput of a communications channel can be measured?

10 MR. STONEDALE: Object to form.

11 THE WITNESS: Again, is there something you can
12 point me to?

13 BY MR. PONDER:

14 Q. I think perhaps somewhere around the 145, 146.
15 I think there is a section on how to detect throughput.

16 A. I don't see a particular discussion of
17 different measures of throughput in Imai. It's possible
18 I'm missing it. It's a big reference.

19 Do you have an exact paragraph number?

20 Q. Paragraphs 149, et sequitur.

21 A. Okay. Yes, I agree with that question.

22 Q. Do you agree that Imai teaches that the system
23 would have more than two encoders?

24 MR. STONEDALE: Object to form.

25 ///

1 BY MR. PONDER:

2 Q. Perhaps paragraph 67 might help.

3 A. Yes.

4 Q. Do you agree that Imai teaches that the
5 different encoders should use different coding methods?

6 MR. STONEDALE: Object to form.

7 THE WITNESS: Well, I'm not sure about the word
8 "should," but paragraph 67 of Imai teaches that the
9 encoders do use different methods.

10 BY MR. PONDER:

11 Q. When you see the first sentence where it says,
12 "The encoders 53 1 to 53 N," and then "(N is two or
13 more)" --

14 A. Yes.

15 Q. -- does that suggest to you that Imai teaches
16 that the system should have at least two encoders?

17 A. Yes.

18 Q. And then going forward to paragraph 69, you
19 agree that Imai gives as an example where there are
20 three different encoders using the same compression
21 algorithm?

22 A. Well, in Imai's paragraph 69, Imai is defining,
23 in double quotes the phrase "different coding methods"
24 in a peculiar way. So that if they have different bit
25 rates, then Imai defines them to be different coding

1 methods, but that's not how a person of ordinary skill
2 in the art would normally view that, and that's not the
3 same usage of different coding methods in the context of
4 the '477 patent.

5 Q. Why wouldn't a POSITA understand that a ATRAC2
6 encoder configured to output data at 64 Kbps, for
7 example, not be a different coding method from an ATRAC2
8 encoder configured to produce output at 32 Kbps?

9 A. That's not the normal usage of that language.
10 A person of ordinary skill in the art would
11 alternatively use the phrasing that those are the same
12 coding methods operating at different bit rates.
13 However, Imai has chosen in paragraph 69 to act as its
14 own lexicographer and define the phrase "different
15 coding methods" in this peculiar way, which is not the
16 way it would be understood within the '477 patent.

17 Q. What if the coding method is implemented as a
18 physical chip that's hard-coded to produce at these
19 different rates, would it be appropriate to say that
20 each encoder is a different encoder?

21 A. Well, I would say that they -- a person of
22 ordinary skill in the art would still say that they're
23 different coding methods and the hardware is operating
24 at different bit rates.

25 Q. Do Imai's encoders 53 1 to N in Imai operate at

1 different data compression rates?

2 A. I don't think Imai teaches anything at all
3 about data compression rates, so a person of ordinary
4 skill in the art wouldn't know the answer to that
5 question. And again, I'm using "data compression rate"
6 in the context of the '477 patent.

7 Q. If a system built according to Imai had an MPEG
8 encoder, an ATRAC encoder, an ATRAC2 encoder --

9 THE REPORTER: Excuse me.

10 BY MR. PONDER:

11 Q. Let me reask that.

12 So if a system according to Imai's teachings
13 had an MPEG encoder, an ATRAC encoder, an ATRAC2
14 encoder, and an ATRAC3 encoder, is it your position that
15 all of those encoders would operate at the same data
16 compression rate as that term is used in the
17 '477 patent?

18 MR. STONEDALE: Object to form.

19 THE WITNESS: I don't remember offhand if there
20 is such a thing or what an ATRAC3 encoder is. Is that
21 what you meant to say?

22 BY MR. PONDER:

23 Q. Let me fix that and just go with MPEG, ATRAC,
24 and ATRAC2. Let me reask that.

25 If a system according to Imai's teachings had

1 an MPEG encoder, an ATRAC encoder, and an ATRAC2
2 encoder, would all those encoders operate at the same
3 data compression rate?

4 MR. STONEDALE: Object to form.

5 THE WITNESS: As I mentioned before, Imai is
6 silent on the issue of data compression rate. And I
7 don't think a person of ordinary skill in the art
8 reading the disclosure of Imai could determine the
9 answer to that question.

10 BY MR. PONDER:

11 Q. And is it your position that a person of
12 ordinary skill in the art would not be able to determine
13 the data compression rate for the MPEG encoder, the
14 ATRAC encoder, and the ATRAC2 encoder as a -- just as a
15 general principle?

16 A. Well, first let me point out that I don't think
17 there was any teaching at all in Imai about data
18 compression rate. So individually any one of those
19 techniques that you mentioned would equally be confusing
20 to a person of ordinary skill in the art reading Imai as
21 to whether or not it's operating at a particular data
22 compression rate.

23 Q. Would a person of ordinary skill in the art
24 have any reason to think that an MPEG encoder, an ATRAC
25 encoder, and an ATRAC2 encoder would all operate at the

1 exact same data compression rate as that term is used in
2 the '477 patent?

3 A. I don't think a person of ordinary skill in the
4 art would know one way or the other --

5 MR. STONEDALE: Object to form.

6 THE WITNESS: Sorry. I'll repeat it.

7 I don't think a person of ordinary skill in the
8 art would know one way or the other because Imai just
9 doesn't discuss data compression rate at all.

10 BY MR. PONDER:

11 Q. If a person of ordinary skill in the art built
12 a system according to Imai's teachings and it included
13 50 different encoders, is it your position that the
14 POSITA would have no way to know whether any two of
15 those encoders operate at the same data compression rate
16 as that term is defined by the '477 patent?

17 A. I don't think a person would have any
18 information at all about the data rate -- I'm sorry --
19 the data compression rate. So no matter how many you
20 have there in your hypothetical, I don't think a person
21 of ordinary skill in the art would know whether or not
22 any two of them have different data compression rates or
23 perhaps whether they were intentionally designed to have
24 the same data compression rate.

25 Q. Is it your position that a person of ordinary

1 skill in the art would not have an understanding at the
2 time of the invention as to whether an MPEG encoder
3 would generally achieve faster data compression rates
4 than an ATRAC encoder?

5 A. Well, since there is no discussion --

6 MR. STONEDALE: Object to form.

7 THE WITNESS: I don't think that the data
8 compression rate would be known to a person of ordinary
9 skill in the art ahead of time because they would need
10 to know how they're used. And Imai doesn't say anything
11 at all about how they're used with respect to data
12 rate -- I'm sorry -- with respect to data compression
13 rate. So I think the answer is a person of ordinary
14 skill reading Imai just wouldn't know.

15 BY MR. PONDER:

16 Q. Is it your position that a person of ordinary
17 skill in the art would not have an understanding at the
18 time of the invention as to whether an MPEG encoder
19 would generally achieve a higher data compression rate
20 than an ATRAC encoder?

21 MR. STONEDALE: Object to form.

22 THE WITNESS: It would really depend on how
23 they're used. And Imai doesn't say anything at all
24 about data compression rate. And data compression rate
25 doesn't play a role in Imai. It's not used in any of

1 the decision-making process about choosing encoders or
2 anything like that.

3 Whether or not there could incidentally be a
4 different data compression rate, that's a question that
5 I didn't offer an opinion about, but I don't know
6 offhand how a person of ordinary skill in the art would
7 know one way or the other since there is no discussion
8 in Imai at all about that, not even a hint or a
9 suggestion.

10 BY MR. PONDER:

11 Q. Is it your position that a person of ordinary
12 skill in the art would not have an understanding at the
13 time of the invention as to whether an MPEG encoder
14 would generate -- generally operate faster to compress a
15 given data set than an ATRAC compressor?

16 A. I don't think a person of ordinary skill in the
17 art would necessarily know that offhand, but they could
18 conceivably take implementations, specific
19 implementations of MPEG layer 3 and of ATRAC2 if they
20 could write the program or get the software from
21 somebody else. And for those particular
22 implementations, presumably they could try it out and
23 see if there is a different data compression rate for a
24 particular implementation of that.

25 So in principle, for a specific hypothetical

1 situation, a person of ordinary skill in the art could
2 try to figure that out, but I don't think they would
3 know offhand without knowing all the details involved.

4 Q. Is it your position that a person of ordinary
5 skill in the art would not have an understanding at the
6 time of the invention as to whether an MPEG encoder
7 would generate -- strike that.

8 Is it your position that a person of ordinary
9 skill in the art would not have an understanding at the
10 time of the invention as to whether an MPEG encoder
11 would generally take longer to compress the same data as
12 compared to an ATRAC compressor?

13 MR. STONEDALE: Object to form.

14 THE WITNESS: When you refer to an MPEG
15 encoder, are you referring to an audio encoder?

16 BY MR. PONDER:

17 Q. Referring to an MPEG audio encoder as
18 referenced in the Imai reference.

19 A. I think a person of ordinary skill in the art
20 would not necessarily know offhand whether any
21 particular MPEG encoder would take longer to compress
22 the same data as for ATRAC without getting a specific
23 implementation of one and the other and then either
24 trying them out and seeing which one is faster or
25 reading a spec sheet or some other kind of technical

1 indication as to which is faster and how long they take
2 to run.

3 Q. Is it your position that a person of ordinary
4 skill in the art would not have an understanding at the
5 time of the invention as to whether an MPEG audio
6 encoder would achieve a higher compression ratio for a
7 given data set than an ATRAC compressor?

8 A. It's a very similar answer, that a person of
9 ordinary skill in the art wouldn't necessarily have
10 these numbers memorized and they wouldn't necessarily
11 have spec sheets memorized in their head, but they would
12 be perfectly capable of testing it out just by checking
13 the encoders and seeing how much compression each one
14 gives, measuring the compression ratios and comparing
15 them or, alternatively, looking on a spec sheet or
16 discussing it with a person that's technically familiar
17 with these specific encoders. So that's really the
18 answer.

19 Q. So is it your position that Imai teaches
20 switching between encoders that have different
21 compression ratios?

22 A. That's basically correct.

23 Q. Turning to the specific example in paragraph 69
24 of Imai. What is the difference in compression ratio
25 between the three different ATRAC2 compressors?

1 A. Well, in paragraph 69 of Imai, it discloses the
2 output rates of at least three operations -- three
3 configurations, let's say, of ATRAC2, those being
4 64 kilobits per second, 32 kilobits per second, and
5 24 kilobits per second.

6 It doesn't explicitly say what the input rates
7 are, but if we were to assume those were all the same,
8 then the different compression ratios -- we wouldn't
9 know exactly what the compression ratios are, but
10 relative to each other we could make a determination
11 because, for example, 32 kilobits is half of
12 64 kilobits. So whatever the compression ratio is when
13 the output rate is 64 kilobits, we could deduce that the
14 compression ratio at 32 kilobits was twice as much, for
15 example.

16 Q. Is that true if the encoders are all able to
17 keep up with the input data rate?

18 MR. STONEDALE: Object to form.

19 THE WITNESS: I'm not sure what you mean by
20 "keep up with the input data rate."

21 BY MR. PONDER:

22 Q. So are you assuming, in making this calculation
23 of the compression ratio, that each of these encoders is
24 taking in the same amount of input data and compressing
25 it in the same amount of time?

1 A. Well, Imai doesn't really speak about the time
2 so much, but I'm trying to deduce what this paragraph 69
3 really says because it is a little bit vague and hard to
4 understand. But I think a person of ordinary skill in
5 the art reading 69 might either conclude or make the
6 assumption, even if it's not true, that the input data
7 rates are the same here. There's a little bit of
8 guesswork because Imai is not very clear.

9 Q. And is there anything in paragraph 69 that
10 tells you whether the different encoders is able to
11 compress data without forming a backlog at these output
12 rates?

13 MR. STONEDALE: Object to form.

14 THE WITNESS: No, it doesn't really say one way
15 or the other.

16 BY MR. PONDER:

17 Q. Would you need to know that to be sure that you
18 can calculate the relative compression rates between
19 these encoders?

20 MR. STONEDALE: Object to form.

21 THE WITNESS: Well, I think what would be
22 needed for a person of ordinary skill in the art to
23 understand what's going on in 69 clearly is to know how
24 much data is coming in versus how much data is going
25 out. And paragraph 69 of Imai reveals the output data

1 rates, 64, 32, and 24 kilobits per second, but at least
2 this paragraph leaves it up to the reader to try to
3 guess the other parameters about what's going on.

4 Maybe it's because it is a Japanese translation
5 and maybe the translation was poorly done, but one way
6 or the other, it is a little bit difficult to figure out
7 from this paragraph.

8 BY MR. PONDER:

9 Q. So to render your opinion that these three
10 different output rates are the result of a difference in
11 compression ratio, you had to make an assumption about
12 the input data rates?

13 A. Basically I was making some assumptions to come
14 to that conclusion. I'm not 100 percent sure, but I
15 think that's one possible guess as to what is going on
16 here. It's a little bit vague in detail.

17 Q. What are the other assumptions that you're
18 making to render your opinion that the different output
19 rates are attributable to changing the compression
20 rate -- ratio?

21 A. Well, first of all, let me point out that I
22 didn't offer an opinion about this specific question in
23 my declaration. I'm just trying to answer you right now
24 in the deposition. And as I stated, this paragraph is
25 rather thin on details. So I'm doing a little bit of

1 guesswork here, and I'm not entirely sure the
2 assumptions I'm making are correct because Imai is not
3 being very clear in this paragraph.

4 But I can give a conditional statement that if
5 the input data is coming in at the same rate for all
6 three of these and the output data is going out at three
7 different rates, then under that hypothesis I could
8 conclude they had different compression ratios. But I'm
9 not sure I can verify the premise to those conditional
10 statements.

11 Q. Is it your position that the three ATRAC2
12 encoders are each operating at the same level of
13 algorithmic efficiency?

14 MR. STONEDALE: Object to form.

15 THE WITNESS: Well, the term "algorithmic
16 efficiency," I'm presuming you're using it in the
17 context of the '477 patent as was, for example,
18 described in column 5 around line 32, which has to do
19 with running time. And Imai is really silent on that
20 throughout and specifically in this paragraph 69. So I
21 don't know what the run times are. I don't think a
22 person of ordinary skill in the art would know either in
23 Imai.

24 BY MR. PONDER:

25 Q. Is it your position that the three ATRAC

1 encoders are each operating at the same execution speed?

2 MR. STONEDALE: Object to form.

3 THE WITNESS: You're referring to paragraph 69
4 still?

5 BY MR. PONDER:

6 Q. Yes.

7 A. I don't think Imai says anything either in
8 paragraph 69 or anywhere throughout the whole disclosure
9 about the operating speeds of these particular three
10 output rates using ATRAC2. So I don't think a person of
11 ordinary skill in the art could figure that out from the
12 rather thin teaching of Imai.

13 Q. Do you have your declaration in front of you?

14 A. I have the -- both of them, A and B.

15 Q. Let's take a look at the one we marked as A
16 from the 1630 IPR.

17 A. Okay.

18 Q. If you could turn to paragraph 68. Let me know
19 when you get there.

20 A. Okay. I'm there.

21 Q. In the last sentence you say, "As I explained
22 above, a person of ordinary skill would understand that
23 limitation 1[B] requires more than encoders with
24 different or varying compression rates."

25 What do you mean by that? What other

1 limitations does 1[B] require?

2 A. Well, the portion that you just read was
3 cutting through the middle of a sentence. The beginning
4 of the sentence starts out, "As I explained above." So
5 it's basically referring to what I described in previous
6 paragraphs. I'm not sure how far back it goes. I would
7 have to look.

8 But I start that section on page 20 at
9 paragraph 54, and you read from paragraph 68. So
10 there's about 14 or 15 paragraphs there that are leading
11 up to this sentence that starts out with "As I explained
12 above."

13 Q. Can you look at these paragraphs and just let
14 me know which portions of these paragraphs describe a
15 claim limitation of 1[B] as opposed to, say, a
16 discussion of the various references?

17 A. So actually the --

18 Q. I might be able to make this simpler.

19 A. Can I finish my answer, please?

20 Q. Yes.

21 A. The beginning of my sentence where I say, "As I
22 explained above," it actually goes beyond where I said I
23 think it's from an earlier discussion in the declaration
24 before the section itself. So if you want, I can track
25 that down.

1 Q. I guess what I want to confirm is the meaning
2 of the sentence "As I explained above, a person of
3 ordinary skill would understand that limitation 1[B]
4 requires more than encoders with different or varying
5 compression rates."

6 Are any of the limitations that you're saying
7 1[B] requires described somewhere in the preceding
8 paragraphs? What I'm trying to get at is I want to make
9 sure you don't have any other opinions as to things that
10 limitation 1[B] requires other than what's recited in
11 this declaration.

12 A. Okay. Let me take a look and I'll answer the
13 question.

14 Q. Okay.

15 A. Okay. So the sentence at question -- in
16 paragraph 68 begins by saying, "As I explained above."
17 And you asked me which paragraphs would be referring to
18 this limitation 1[B]. And I believe I'm referring back
19 to starting at paragraph 36, which is a paragraph before
20 that. And then -- so paragraph 36 and 37, et cetera.
21 This is under the title section Roman numeral V, which
22 reads, "The requirements of limitation 1[B]."

23 And this is where I'm offering the opinion that
24 the phrase "configured to" has some intent involved in
25 it. I guess that comes around paragraph 39, and --

1 yeah, 38 and 39 is where I discuss "configured to,"
2 saying that it requires a purposeful design and there is
3 some intent there. It's not just by an accidental
4 arrangement or side effect or happenstance.

5 And so that's what I'm referring to in
6 paragraph 68 when I say, "As I explained above, a person
7 of ordinary skill would understand that limitation 1[B]
8 requires more than two" -- I'm sorry -- "more than
9 encoders with different or varying compression rates."
10 In other words, it requires that they are not just there
11 by random occurrence, but they're intentionally there
12 for a purpose.

13 Q. What is the benefit of a system having multiple
14 compression encoders, having compression encoders that
15 operate at different data compression rates?

16 MR. STONEDALE: Object to form.

17 THE WITNESS: There's some examples in my
18 declaration, such as in paragraph 40 and 41, of examples
19 that answer that question.

20 BY MR. PONDER:

21 Q. Why wouldn't a POSITA always want to use the
22 compression encoder that has the fastest data
23 compression rate?

24 MR. STONEDALE: Object to form.

25 THE WITNESS: Well, one example might be that

1 if the data after compression was being transmitted
2 across a channel that was very clogged up, then there
3 wouldn't be a lot of space to handle more data going
4 through it.

5 So by using a faster data compression rate, the
6 output rate would be increased potentially to the level
7 that it wouldn't be able to go across the available
8 space that's not being used in the channel at that time.
9 So that would be a deterrent to a person of ordinary
10 skill in the art to using a faster data compression
11 rate.

12 BY MR. PONDER:

13 Q. So if you use a faster data compression rate,
14 you achieve a higher output rate?

15 A. Well, if you use a faster data compression
16 rate -- if you go back to the definition of data
17 compression rate as measuring the amount of input data
18 that can compress per unit of time at a given
19 compression ratio, so if you increase the data
20 compression rate, you're pulling in more input data per
21 unit time at a given compression ratio. So that
22 would -- in general, that would increase the output rate
23 of the encoder, so you'd be having to send more data
24 across the channel.

25 Q. And if you use a slower -- strike that.

1 Why would a POSITA want to use a slower data
2 compression rate?

3 A. Well, that --

4 MR. STONEDALE: Object to form.

5 THE WITNESS: That would be almost the same
6 answer. I think you asked me in the previous question
7 why a person of ordinary skill would not want to use a
8 faster data compression rate. And now you're asking
9 me why a person would want to use a slower data
10 compression rate. That's basically the same question
11 just reworded.

12 BY MR. PONDER:

13 Q. I think it's the inverse relationship. It's --
14 what would the impact be on the output data rate if you
15 use a slower compression rate?

16 A. Well, okay. It sounds like the same question
17 in disguise. But basically if you use a slower data
18 compression rate, then you're pulling in less data per
19 unit time to encode, so that's generally going to result
20 in less output data that has to go across the channel.
21 So the reason you might want to do that is if the
22 channel is very congested, that way you could fit it
23 through the available space on a channel.

24 MR. PONDER: Let's take a break.

25 (Recess, 3:05 p.m. to 3:16 p.m.)

1 MR. PONDER: Let's go back on the record.

2 BY MR. PONDER:

3 Q. Dr. Zeger, have you spoken to anyone today
4 during the breaks?

5 A. Not at all. Well, except for the court
6 reporter right here. We spoke.

7 Q. So you haven't discussed the substance of your
8 communications -- substance of your testimony with
9 anyone today?

10 A. I haven't had any conversation with anybody.

11 Q. Okay. Is it your position that the data
12 compression rate of an encoder is one of the -- one or
13 more data parameters recited in claim 1?

14 MR. STONEDALE: Object to form.

15 THE WITNESS: Well, I did not offer an opinion
16 regarding that question in my declaration, and I'm not
17 sure I have an opinion about that. I don't believe that
18 was an issue in this IPR. I didn't recall seeing that
19 in Dr. Storer's declaration nor in the petition. So I
20 think at this point I don't really have an opinion about
21 that. I would need to think more about that.

22 MR. PONDER: We'll pass the witness.

23 MR. STONEDALE: Thank you.

24 ///

25 ///

EXAMINATION

BY MR. STONEDALE:

Q. Dr. Zeger, I want to ask a few questions to clarify your testimony.

Can you look at paragraph 70 of your declaration in IPR2018-1630, which I believe we're calling A.

A. Which paragraph?

Q. 70. 7-0.

A. Okay. I'm there.

Q. Now, in this paragraph, do you see where you say, "The quoted teaching from Imai describes lowering the encoder's output bit rate to accommodate a slow network"?

MR. PONDER: Objection. Form.

BY MR. STONEDALE:

Q. And --

A. Wait. I'm sorry. I don't see where that is.

Q. At the bottom of page 24 --

A. Oh, I see. "The quoted teaching" -- I see, yeah. I guess that's similar to what he was asking me earlier about a purpose of the Imai.

MR. PONDER: Objection. Form. Leading.

BY MR. STONEDALE:

Q. So if you read that paragraph, did you

1 disclose -- or did you disclose any purpose of Imai in
2 that paragraph?

3 A. Yes. As I just said before you asked me the
4 question, this is generally describing a purpose of Imai
5 in terms of lowering the encoder's output to accommodate
6 a slow network.

7 Q. Is Imai seeking to transmit the data in
8 realtime?

9 MR. PONDER: Objection. Form. Leading.

10 THE WITNESS: Again, that's the next -- it's
11 all here in my paragraph. I'm pointing out that the
12 petition is agreeing to that fact, that Imai -- one of
13 the objectives was to transmit data in realtime. I have
14 a quote from, I guess, the very beginning of Imai in
15 paragraph 001. I'm going to go to that paragraph in
16 Imai right now.

17 And in that paragraph, 001, that's basically
18 the beginning of the technical field to which the
19 invention belongs. And actually, I'm sorry. I think
20 that I may be mixing up the references here, but I think
21 I'm quoting -- it refers back to 1005. Okay. That's
22 Imai, right. And I have a quotation in my paragraph 70
23 that supports that.

24 BY MR. STONEDALE:

25 Q. To clarify your earlier testimony, is this one

1 of the purposes of Imai you had in mind when you made
2 the statement about Imai's purpose in your declaration?

3 MR. PONDER: Objection. Form.

4 THE WITNESS: Yes.

5 MR. PONDER: And leading.

6 If you can pause just an extra second. If you
7 can pause just an extra second before you answer.

8 THE WITNESS: I'm sorry about that. Yes.

9 MR. PONDER: Go ahead, Joel. We finished that.

10 MR. STONEDALE: Yes. Sorry. I was just
11 pausing.

12 BY MR. STONEDALE:

13 Q. In the combined system of Imai and Pauls
14 proposed by the petition, are you familiar with the
15 combined system proposed by the petition where Imai and
16 Pauls are combined?

17 A. Yes.

18 MR. PONDER: Objection. Beyond the scope.

19 BY MR. STONEDALE:

20 Q. In that system, would the purpose to transmit
21 the data in realtime still be present?

22 MR. PONDER: Objection. Beyond the scope. And
23 form.

24 THE WITNESS: I think it would depend. Can you
25 point me to a paragraph where I offer an opinion about

1 that so I can refresh my memory?

2 BY MR. STONEDALE:

3 Q. You described the modification that the
4 petition suggests to Imai, described a combination in
5 paragraph 137 to 140, described the modification.

6 MR. PONDER: Objection. Beyond the scope.
7 Leading. Form.

8 THE WITNESS: Was there a specific question
9 or -- I don't recall what the question was.

10 BY MR. STONEDALE:

11 Q. So yes. I wanted to ask. Would the
12 combination -- would the combined system of Imai and
13 Pauls share the purpose of Imai alone transmitting the
14 data in realtime?

15 MR. PONDER: Objection. Beyond the scope.
16 Leading. Form.

17 THE WITNESS: I don't recall the combination
18 proposed saying whether that would still be -- whether
19 it would retain the purpose of Imai in terms of realtime
20 transmission, but I don't recall it being preserved. So
21 I think -- unless I'm missing an opinion I have, I'm not
22 seeing my paragraph where I discussed that.

23 BY MR. STONEDALE:

24 Q. Okay. Earlier when you indicated that a POSITA
25 might use a slower data compression rate to fit the data

1 through a channel with low capacity, would that approach
2 also be applicable in the situation where the data is
3 seeking to be transmitted in realtime?

4 A. I have an opinion about that in my declaration.
5 I don't recall exactly where it is, but let me see if I
6 can spot it.

7 MR. PONDER: Objection. Scope. Form.

8 THE WITNESS: Well, I don't see where it is,
9 but I remember the opinion. I can just paraphrase it.
10 But basically the idea is that if something were
11 operating in realtime and a -- for some reason if the
12 data rate were sped up on the encoder, then that would
13 have more data coming in and it would produce a higher
14 output data rate and that would -- okay. That would
15 produce a higher output rate.

16 But in the other situation if the data rate
17 were lowered, then less data would be coming in per unit
18 time and then you would have a problem keeping up with
19 realtime. For example, if you had a realtime
20 videoconference going on, what used to operate at
21 realtime is now pulling in data slower. So you would
22 not preserve the realtime aspect of it in that
23 situation. So that would defeat one of the goals of
24 Imai if that type of situation were used in the
25 combination.

1 BY MR. STONEDALE:

2 Q. So to clarify. Is there a reason a POSITA
3 would use an encoder with a slower data compression rate
4 if the POSITA were seeking to transmit data in realtime?

5 MR. PONDER: Objection. Form. Scope.

6 THE WITNESS: I think that a person of ordinary
7 skill that had a system that was operating in realtime
8 such as Imai would not be motivated to destroy the
9 realtime aspect of it. So in particular they would want
10 to avoid slowing down the data rate of the encoder
11 because then what was previously operating in realtime
12 would now be taking in data at a lower rate. And I know
13 I have an example somewhere here where I explained that,
14 but that's the gist of it. They would not want to do
15 that.

16 BY MR. STONEDALE:

17 Q. Okay. I want to ask a further question about
18 your earlier testimony when you were talking with
19 Mr. Batts about output bit rates and what you could
20 infer from output bit rates.

21 A. Okay.

22 Q. So would it be possible, in your opinion, to
23 calculate the output bit rate -- sorry -- calculate the
24 compression rate of an encoder from its output bit rate?

25 MR. PONDER: Objection. Form.

1 THE WITNESS: Not in general. I think I
2 testified to that already that given the output rate
3 that's not enough information to deduce what the data
4 compression rate is.

5 BY MR. STONEDALE:

6 Q. Would it be enough information if you had the
7 output rate and also the compression ratio?

8 MR. PONDER: Objection. Leading. Scope.
9 Form.

10 THE WITNESS: Even in that situation, I don't
11 think you would be able to know definitively the data
12 compression rate because there is more to it than that.

13 BY MR. STONEDALE:

14 Q. Could you also look at paragraph 64 in
15 Exhibit A.

16 A. Okay.

17 Q. Could you please read paragraph 64 through 66.

18 MR. PONDER: Objection. Form. Scope.

19 THE WITNESS: Okay.

20 BY MR. STONEDALE:

21 Q. And is it your understanding that anything --
22 any of your testimony today calls into question any of
23 those paragraphs or would you stand by all the
24 statements from those paragraphs?

25 A. Everything in these paragraphs you just

1 mentioned, 64 to 65, after rereading it, I stand by it
2 still.

3 Q. Is that also true of paragraph 66?

4 A. Yes. I think I meant to say paragraph 64, 65,
5 and 66, all three of those, nothing in my testimony
6 today contradicted any of that.

7 MR. STONEDALE: Okay. That's all I have.
8 Thank you.

9 Pass the witness.

10 MR. PONDER: Thank you. That's it.

11 THE REPORTER: Mr. Stonedale, on the record, I
12 want to get your order of a certified copy, as you
13 ordered the realtime screen for the witness.

14 (Discussion held off the record.)

15 MR. STONEDALE: Oh, okay. Yes. And I ordered
16 realtime for the witness. Got it.

17 (Deposition adjourned at 3:35 p.m.)

18 * * * * *

ERRATA SHEET

Case Name:

Deposition Date:

Deponent:

Pg.	No.	Now Reads	Should Read	Reason
6	_____	_____	_____	_____
7	_____	_____	_____	_____
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19	_____	_____	_____	_____

Signature of Deponent

SUBSCRIBED AND SWORN BEFORE ME

THIS ____ DAY OF _____, 2019.

(Notary Public) MY COMMISSION EXPIRES: _____

REPORTER'S CERTIFICATE

I, Cynthia J. Vega, a Certified Shorthand Reporter for the State of California, do hereby certify:

That the witness in the foregoing deposition was by me duly sworn; that the deposition was then taken before me at the time and place herein set forth; that the testimony and proceedings were reported by me stenographically and were transcribed through computerized transcription under my direction; and the foregoing is a true and correct record of the testimony and proceedings taken at that time.

I further certify that I am not of counsel or attorney for either or any of the parties in the foregoing proceeding and caption named or in any way interested in the outcome of the cause in said caption.

IN WITNESS WHEREOF, I have subscribed my name this 19th day of July, 2019.



Cynthia J. Vega, CSR No. 6640