UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

AYLO FREESITES, LTD and fuboTV MEDIA, INC.,

Petitioner,

vs.

DISH TECHNOLOGIES, L.L.C.,

Patent Owner.

IPR2024-000431 (Patent 11,677,798 B2)

IPR2024-00044 (Patent 11,470,138 B2)

IPR2024-00045 (Patent 10,469,544 B2)

IP42024-00046 (Patent 10,951,680 B2)

IPR2024-00146 (Patent 10,469,555 B2)2

Washington, D.C.

Tuesday, October 1, 2024

Deposition of DR. KEVIN JAFFAY in the above-entitled matter, pursuant to notice, the witness being duly sworn by Barbara J. Moore, a Notary Public in and for the District of Columbia, taken at the offices of BAKER BOTTS, LLP, 700 K Street, NW, Washington, D.C., commencing 9:06 a.m. and the proceedings being taken down by Stenotype by BARBARA MOORE, CRR, RMR, and transcribed under her direction.

Aylo Exhibit 1030
Aylo Freesites v. DISH Technologies, IPR2024-00146

APPEARANCES:

VENABLE, LLP
By: Ian Paquette, Esq.
151 West 42nd Street
New York, New York 10036
3212.218.2347
igpaquette@venable.com
Appearing on behalf of Petitioner

By Philip Sheng, Esq.
101 California Street, Suite 3800
San Francisco, California 94111
415.343.4493
ptsheng@venable.com
Appearing on behalf of Petitioner

BAKER BOTTS, LLP
By: Andrew Wilson, Esq.
Eliot D. Williams, Esq. (Via Zoom)
1001 Page Mill Road
Building One, Suite 200
Palo Alto, California 94304-1007
650.739.7510
andrew.wilson@bakerbotts.com
Appearing on behalf of Patent Owner

ALSO PRESENT:

Deshawn White, Videographer
Jamie R. Lynn, Esq., Dish In-House Counsel
James Edell (Appearing by Zoom)
James Hanft (Appearing by Zoom)

TABLE OF CONTENTS

WITNESS		PAGE
KEVIN JAFFAY		
By Attorney Sheng		5
	EXHIBITS	
EXHIBIT	DESCRIPTION	PAGE
BY ATTORNEY WILSON		300
Exhibit 1	Patent	57
Exhibit 2	Declaration	60
Exhibit 3	Declaration	77
Exhibit 4	Patent	83
Exhibit 5	Article	110
Exhibit 6	Declaration	145
Exhibit 7	Patent	165
Exhibit 8	Patent	165
Exhibit 9	Patent	201
Exhibit 10	Patent	250

Exhibit 6 was retained by counsel

P R O C E E D I N G S

THE VIDEOGRAPHER: We are now on the record at 9:06 a.m. Eastern time on Tuesday, October 1, 2024, for the stenographically recorded and video-recorded deposition of Dr. Jaffay in the action Aylo Freesites, LTD, and Fubo TV Media, Inc., versus Dish Technologies.

My name is Deshawn White, videographer, and Ms. Barbara Moore is the court reporter. We are with Hudson Court Reporting and Video Nationwide. This deposition is being held at Baker Botts, LLP, at 700 K Street, NW, Washington, D.C.

Counsel, can you please introduce yourselves for the record, followed by the court reporter administering the oath.

ATTORNEY SHENG: My name is Philip Sheng with the law firm Venable, LLP. I'm joined today with my colleague, Ian Paquette, also with Venable. We represent the Aylo Freesites petitioner.

ATTORNEY WILSON: Andrew Wilson with Baker Botts, LLP, for patent owner Dish. I'm joined here with Jamie Lynn, also with Baker Botts and also with Elliot Williams, also with Baker Botts.

****

KEVIN JAFFA,

having been called as a witness on behalf of the Patent Owner and having been first duly sworn, was examined and testified as follows:

EXAMINATION BY

ATTORNEY SHENG:

Q. Doctor, good morning. Have you been deposed before?

A. I have.

Q. Approximately how many times?

A. Enough that I think I've lost count.

Q. Not counting the IPRs at issue today, approximately how many IPRs have you been involved with as an expert?

A. Probably 15 or 20.

Q. Among those 15 or 20 IPRs you've been involved with, approximately how many of those IPRs were you retained by a patent owner as opposed to a petitioner?

A. It's probably a -- patent owner versus petitioner, probably a 30/70 split.

Q. Do you have a personal preference representing a patent owner as opposed to a petitioner?

A. No. It really all depends on the specifics of the patent.

Q. What do you mean by that?

A. Well, before I agree to take on a case, I review the patents and try and make my own determination as to what are the chances that I think the patent is valid or invalid. So in that sense, it doesn't really matter to me whether it's a patent owner or a petitioner. If I think the patent is valid or likely valid, I'm happy to work for a patent owner. If I think the patent is invalid or likely invalid, then I'm happy to work for a challenger.

Q. You said that approximately 30 percent of your work is for patent owners and 70 percent is for petitioners; is that correct?

A. Yeah. That's a guess, but that's probably -- that's my best guess.

Q. In your experience then, do you agree that around 70 percent of the cases that are

proposed to you, you believe that the petitioner is challenging an invalid patent?

ATTORNEY WILSON: Objection. Form.

THE WITNESS: No, that's not accurate.

BY ATTORNEY SHENG:

Q. Among the cases that you've been asked to handle, you just testified that about 30 percent are for patent owners, 70 percent are for petitioners; correct?

A. No, that was not my testimony.

Q. What was your testimony?

A. My testimony was that those that I've actually accepted and worked on, that's the split.

Q. Okay. So among the cases that you've actually worked on, would you agree that 70 percent of your work involves patents that are likely invalid?

A. It involves -- so, again, that's just a guess, but for that guess, those were the cases for which I had a basis for believing the patent was invalid.

Q. Do you understand that this

deposition relates to five IPR petitions filed by petitioner Aylo Freesites, LTD?

A. I do.

Q. Each IPR challenges a different Dish patent; is that correct?

A. That's my understanding.

Q. I'm handing you what's been previously marked as Exhibit 2001.

A. Thank you.

Q. Exhibit 2001 is the expert report you submitted in support of Dish's patent owner preliminary response.

Do you agree?

A. That's what it appears to be.

Q. If I refer to patent owner preliminary response as POPR, will you understand what I'm referring to?

A. Yes.

Q. Can you turn to paragraph 3.

A. Okay. (Witness complies with request.)

Q. Do you believe that the patents listed in Paragraph 3 of Exhibit 2001 are the Dish patents at issue in these IPRs?

A. For the five IPRs, this looks like

the list of the five patents.

Q. In paragraph 3, you refer to Dish's patents as the ABR patents.

Do you see that?

A. I do.

Q. I'm going to do the same today and refer to the patents that are at issue in these IPRs collectively as the ABR patents, okay?

A. That's fine.

Q. The ABR patents at issue in these IPR proceedings are related. Do you agree?

A. Yes.

Q. The ABR patents share the same specifications. Agree?

A. Yes.

Q. My goal is to get us out of here as quickly as possible. Can we agree that if we discuss one patent's disclosure such as the '138 patent's disclosure, our discussions will apply to the other ABR patents at issue in these IPR proceedings?

A. If you're referring to the figures and the specification of that patent, I can agree.

Q. Fair enough. Are you aware that MG Freesites changed its name to Aylo Freesites?

A. No.

Q. Have you heard of the term MG Freesites before?

A. No.

Q. Have you ever used the term "MG Freesite" before?

A. I doubt it.

Q. You've never used the word "MG Freesites" in any of your expert reports?

A. Other than this matter, I don't think I've ever encountered them.

Q. So you're not aware that a company once known as MG changed its name to Aylo?

A. Correct.

Q. Do you understand that outside of these IPRs, Aylo and Dish are involved in a litigation in other courts?

A. Yeah, I have some understanding of that.

Q. When were you first approached by Dish to serve as an expert for Dish?

A. I believe it was in 20 -- either late 2020 or early 2021.

Q. Was that for a specific litigation, do you recall?

A. Yes.

Q. Do you remember what case that was for?

A. It was for an action in the International Trade Commission.

Q. And following that action in the International Trade Commission, when was the next time -- or what was the next case that you were asked by Dish to serve as an expert, do you remember?

A. I believe it was the case related to these IPRs.

Q. Were you retained on behalf of Dish to serve as an expert in a case in the Northern District of California, do you recall?

A. I don't recognize any case like that.

Q. What about a case in the District Utah, do you recall?

A. I know there is a case in the District of Utah, and I believe they asked me to submit a declaration for that, but other than that, I don't have -- yet have any involvement in that case.

Q. Other than the declaration you

submitted in the District of Utah, you've had no involvement in the District of Utah case; is that correct?

A. Correct.

Q. Are you aware that Aylo and Dish are involved in litigation overseas in the United Kingdom, Germany in Unified Patent Court?

A. No.

Q. You haven't been asked by Dish to serve as an expert in any deposition overseas; is that correct?

A. That's correct.

Q. You've never seen any filings in any of the overseas litigation; is that correct?

A. I believe that is correct.

Q. When Dish first contacted you to serve as an expert in these IPRs, who contacted you?

A. I don't remember.

Q. Was it Baker Botts?

A. Yes, it was definitely Baker Botts. I thought you were asking for a person.

Q. You don't recall the name of the attorney?

A. No. It was one of the attorneys

that I had worked with in the ITC, but there was several attorneys, and I just don't recall which ones specifically contacted me.

Q. On this initial call, before you were retained as an expert, what did you and this attorney discuss, do you recall?

ATTORNEY WILSON: Objection. Privileged.

THE WITNESS: I'm sorry, ask that question again.

BY ATTORNEY SHENG:

Q. Before you were retained as an expert on these IPRs, what did you and this attorney discuss, do you recall?

ATTORNEY WILSON: Same objection.

THE WITNESS: No, I don't recall.

BY ATTORNEY SHENG:

Q. You have no recollection at all?

A. My only recollection was that I was asked to help with IPRs that had been filed challenging the patents, some of the patents that had been at issue in the ITC.

Q. You're being compensated by Dish for your time today; correct?

A. Correct.

Q. What's your hourly rate?
A. $800 an hour.
Q. Is that your customary rate?
A. It is today.
Q. Are you giving Dish any discounts, given the amount of work that you've done for them?
A. No.
Q. Has your rates increase since the ITC action?
A. I think it has.
Q. Did you charge -- strike that.
Did you increase your rates that you charge Dish after you increased them after the ITC action?

ATTORNEY WILSON: Object to the form.

THE WITNESS: I'm sorry. You're going a little fast, can you say that again.

BY ATTORNEY SHENG:

Q. Sure. You testified that you increased your rate after the ITC action; correct?
A. My rate was increased after the ITC action. The increase in the rate had nothing to do with the ITC action.
Q. And did you -- for this -- for these

IPRs, are you charging Dish the same rate that you charged in the ITC action or the increased rate?

A. I believe I'm charging my -- I'm charging Dish the same rate I charge everybody else today, which is I believe more than what my rate was in 2020.

Q. What did you do to prepare for this deposition?

A. I reviewed the declarations that I submitted. I reviewed the patents. I reviewed Dr. Houh's declaration. I reviewed the exhibits that are cited in the declaration. I reviewed the prior art references that Dr. Houh was relying on. And then I had discussions with Dish's counsel.

Q. Which counsel is that?

A. It was -- do you want the individual names?

Q. Sure.

A. It was Mr. Wilson, Mr. Williams, Mr. Lynn was there for some of it, and then another person that I only know -- I don't remember his last name. First name was Nolan.

Q. How long did you guys meet for?

A. We had several calls. Each was about an hour and a half to two hours.

Q. Did you meet in person?
A. No.
Q. When was the last time that you guys met? Was it over Zoom?
A. Yes.
Q. When was the last time you had met over Zoom?
A. Or over Teams. We met over Teams yesterday.
Q. How long was that meeting yesterday?
A. I think it was about two hours.
Q. So you said that you reviewed your declarations in this matter. Is that the declaration for the POPR?
A. Yes, I believe so.
Q. And then you also submitted declarations in support of Dish's patent owner response, POR; is that correct?
A. Yes. I was primarily referring to the POR declarations.
Q. Did you review the declaration you submitted in support of Dish's POPR?
A. I believe I did.
Q. How many times did you review that declaration cover to cover?

A. I don't know. It wasn't a discreet -- it wasn't a discreet reading cover to cover.

Q. Did you review each declaration for each patent, or did you review just one declaration for one patent?

A. I think for the POPR, I reviewed one, and for the POR I reviewed them all.

Q. Ballpark, approximately how many hours total did you spend preparing for this deposition?

A. Maybe fifteen-ish.

Q. And you testified that you, in preparation for this deposition, reviewed the ABR patents; is that correct?

A. Correct.

Q. Did you review each one of the ABR patents, or did you just review one of them?

A. I reviewed them all.

Q. How many times would you say you read each patent cover to cover in preparation for this deposition?

A. I don't know. I did not read each cover to cover, because, as you say, they essentially have the same specification.

Q. So you would agree that the ABR patents have essentially the same specification; is that correct?

A. Yes.

Q. How many times did you review the declaration that Dr. Houh submitted in support of Aylo's IPR petitions?

A. In total? Probably about three, three-ish times.

Q. In preparation for this deposition, did you review the transcript of Dr. Houh's deposition that was taken earlier this year?

A. No.

Q. Have you ever reviewed it?

A. I don't recall if I reviewed it or not.

Q. Sitting here today, you don't recall ever having reviewed Dr. Houh's deposition transcript in these IPRs; correct?

A. In these IPRs, as I said, I don't recall if I reviewed his transcript or not.

Q. Are you aware of that -- strike that.

Do you know who Robert Drew Major is?

A. I do.

Q. Who is he?

A. He is one of the named inventors on the patents.

Q. Have you spoken to him before?

A. I don't believe so.

Q. You've never spoken to Mr. Major; correct?

A. That's my recollection.

Q. Do you understand that Mr. Major was deposed in these IPRs?

A. Yes.

Q. Have you reviewed his deposition transcript?

A. Yes.

Q. Why did you review his deposition transcript?

A. I was asked to review it.

Q. And are you aware that Mr. Major submitted a declaration in these IPRs?

A. Yes.

Q. Have you reviewed that declaration?

A. Yes.

Q. Was it in preparation for this deposition?

A. Well, initially it was in -- I

reviewed it during the course of writing these declarations.

Q. Do you know who David Ericson is? I asked you that already. Yes, do you know who David Ericson is?

A. I have some understanding of who David Ericson is.

Q. Have you ever spoken to him?

A. No, I don't believe so.

Q. What's your understanding of who Mr. Ericson is?

A. He was an employee at EchoStar, then Sling, I guess.

Q. Do you understand that Mr. Ericson had his deposition taken in these IPRs?

A. Yes.

Q. Have you reviewed his deposition transcript?

A. Yes.

Q. Why did you review his deposition transcript?

A. I was asked to review it.

Q. Have you reviewed Mr. Ericson's declaration that he submitted in these IPRs?

A. No, I don't believe so.

Q. So you've never reviewed Mr. Ericson's declaration; is that correct?

A. I don't have a recollection of having reviewed Mr. Ericson's declaration.

Q. Please go back to Exhibit 2001. This is the expert report you submitted in support of Dish's POPR.

A. Right.

Q. I'll represent to you that the expert reports you submitted in support of Dish's POPRs for all the ABR patents is substantively identical.

Do you have a reason to disagree with me?

A. No, not really.

Q. How much time did you spend drafting the expert report that has been marked Exhibit 2001?

A. I didn't review any of the records for the POPR declaration, so I really don't recall.

Q. You didn't review any of the records for the POPR declaration?

A. Any of my records, like timesheets.

Q. Okay. Are you able to give me an approximation as to how many hours you spent drafting the expert report, 2001?

A. No. As I say, I mean, this one was long enough ago. I really don't recall how long I spent working on this.

Q. Did you draft Exhibit 2001 yourself?

A. I believe, if my recollection is correct, that I generated the first draft of this, and then iterated on it with Dish's counsel.

Q. How many times did you review the draft of your expert report cover to cover prior to signing it?

A. I don't recall.

Q. Before you signed it, you confirmed, though, that the opinions in Exhibit 2001 were your own?

A. Yes. And that they were correct.

Q. So before signing Exhibit 2001, you confirmed that everything in that report was correct?

A. To the best of my knowledge at that time, that is the case.

Q. As you sit here today, are you aware of anything in Exhibit 2001 that needs to be corrected?

A. No.

Q. Please turn to page 1 of

Exhibit 2001.

A. (Witness complies with request.)

Okay.

Q. There's a Section B titled "Background and Qualifications."

Do you see that?

A. I do.

Q. I don't want you to read the entire section, but can we agree generally that you've accurately stated your background and qualifications in this section?

A. That was certainly my attempt.

Q. Are you aware of anything in the Background and Qualifications section that needs to be corrected?

A. No. And I think I misspoke. I think I said my attempt. I meant it was my intent. Sitting here today, I'm not aware of any errors in this background section.

Q. Are you the named inventor on any patents?

A. I am.

Q. How many patents are you a named inventor on, do you know?

A. I believe it's four.

Q. When was the last time you applied for a patent or had someone apply for a patent on your behalf?

A. I think the last patent -- so all the patents that my name appears on has been patents that came out of graduate students' dissertation research projects, and they were primarily because the graduate student wanted to file a patent.

So the last patent -- the last graduate student that I remember that wanted to do this was a fellow named Ben Newton, and I will say we filed -- he wanted to file in 2016, maybe.

Q. Are you generally familiar with the patenting process?

A. I have some familiarity with it, yes.

Q. Do you understand what a non-provisional patent application is?

A. It's been explained to me in the past. I don't recall the distinctions between the non-provisional and the provisional, sitting here today.

Q. Are you familiar with the term "prosecution history"?

A. Yes.

Q. What's your understanding of what prosecution history means in the context of patents?

A. It's a record of all the back-and-forth between the applicant and the PTO.

Q. You would agree that the prosecution history of a patent includes the non-provisional patent application; correct?

ATTORNEY WILSON: Objection. Calls for a legal conclusion.

THE WITNESS: I don't know that one way or another as a factual matter.

BY ATTORNEY SHENG:

Q. You have no understanding as a factual matter whether or not a non-provisional patent application is considered part of a patent's prosecution history; correct?

ATTORNEY WILSON: Same objection.

THE WITNESS: I can only say that today I don't recall much about what the details of a non-provisional application are. I know that the file history consists of all of -- as I say, all of the proceedings between the applicant and

the patent office. I would assume it would -- it would include something like -- something like an application or the provisional application or non-provisional application, but as a factual matter, I mean, I just don't know.

BY ATTORNEY SHENG:

Q. So the answer to my question is yes, you have no understanding as a factual matter whether or not a non-provisional patent application is considered part of a patent's prosecution history; correct?

ATTORNEY WILSON: Same objection.

THE WITNESS: As a factual matter, I don't know that one way or another.

BY ATTORNEY SHENG:

Q. Do you know as a legal matter?

A. No.

Q. What about a provisional patent application? Do you have any understanding as a factual matter whether or not the provisional patent application is considered part of a patent's prosecution history?

A. I've certainly seen provisional

applications in the file history, so it would be my assumption that it's part of the file history, but, you know, as a legal matter, I don't know.

Q. If someone asked you to review the entire prosecution history of Dish's ABR patents, in your view, would that include a patent's provisional application?

A. I would assume the provisional application would be part of the file history.

Q. So the answer is yes?

A. Sorry, what was the question?

Q. If someone asked -- if someone asked you to review the entire prosecution history of Dish's ABR patents, in your view, would that include a patent's provisional application?

A. Yes. As I say, my assumption is that it would.

Q. Could you please turn to page 6 of Exhibit 2001.

A. (Witness complies with request.)

Okay.

Q. On page 6 of your expert report, you have a section titled "Well-known legal principles."

Do you see that?

A. I do.

Q. Can you review paragraph 22 of your expert report to yourself and let me know when you're done.

A. Sure. I'm done.

Q. The legal principles you discuss in Section 2 of your expert report marked Exhibit 2001 were provided to you by Dish's counsel; correct?

A. Yes.

Q. And you applied these legal principles in Section 2 of your expert report in arriving at the opinions set forth in these IPRs; correct?

A. Yes.

Q. Can we -- strike that.

Can we agree that you applied the legal principles in Section 2 of your expert report consistently throughout these IPRs? In other words, you didn't apply one definition of prior art in this expert report and a different definition of prior art in one of your later expert reports?

ATTORNEY WILSON: Object to the form.

THE WITNESS: With respect to this statement about prior art, that is

absolutely true.

BY ATTORNEY SHENG:

Q. So focusing on Section A, prior art, for example, you applied the legal principles in Section A titled Prior Art consistently throughout these declarations; is that right?

A. I believe I did.

Q. And the same is true for Section B, Presumption of Validity?

A. Yes.

Q. You applied the same legal standards in Section B consistently throughout these IPRs in forming your opinions; correct?

A. Yes.

Q. You didn't change the legal standard or apply a different one midway through these IPRs; is that correct?

A. I'm looking at paragraph 26. It says that the MG defendants bear the burden of proving invalidity through facts supported by clear and convincing evidence. And I thought the standards for an IPR were just a preponderance of the evidence.

So I mean, this declaration says what it says, and these were the correct standards that

were provided to me.

Q. Okay. Can you please review paragraph -- strike that.

Can you please review paragraph 26 to yourself and let me know when you're done.

A. I've reviewed it.

Q. In paragraph 26 of your expert report, you describe your understanding of the clear and convincing evidence standard; is that correct?

A. Yes.

Q. And in paragraph 26 you state, "It is my further understanding that the MG defendants bear the burden of proving invalidity through facts supported by clear and convincing evidence."

Did I read that right?

A. You did.

Q. If I represented to you that MG has rebranded its name to Aylo, do you have any reason to dispute that?

A. No.

Q. It is your understanding that petitioner Aylo bears the burden of proving invalidity with clear and convincing evidence; correct?

A. That appears to have been my understanding at the time I wrote this declaration.

Q. It's your understanding that the clear and convincing evidence standard means evidence which reduces an abiding conviction of the truth of a factual convention is highly probable; correct?

A. That was the understanding that I was given.

Q. Can you please review paragraph 27 to yourself and let me know when you're done.

A. Sure.

Q. It's your understanding that in these IPRs, the burden of proving invalidity --

A. Actually, I don't mean to interrupt. When I said "sure," I was meaning yes, I will do what you asked.

Q. Very good.

A. So I wasn't done. Okay. Now you can proceed.

Q. It is your understanding that in these IPRs, the burden of proving invalidity by clear and convincing evidence based on a reference or a combination of references is especially difficult when any of those references was before

the USPTO examiner during the prosecution of the relevant patent application; is that right?

A. That was the understanding that I was given.

Q. Is it your understanding or the understanding that was given to you?

A. This is the understanding that I was given.

Q. Prior to these IPRs, did you have any understanding whether or not the burden of proving invalidity based on a reference or a combination of references was especially difficult when any of those references was before the USPTO examiner?

A. Yes.

Q. What was that understanding?

A. It was similar to this, that if a reference had been before the examiner of the PTO, it was to be assumed that the examiner had fully considered that reference.

Q. So let me ask you again, is it your understanding that in these IPRs, the burden of proving invalidity by clear and convincing evidence based on a reference or a combination of references is especially difficult when any of those

references was before the USPTO examiner during the prosecution of the relevant patent application; correct?

A. Yes.

Q. And according to you, the reason is because it is presumed that the examiner considered those references prior to allowing the claims; is that right?

A. Yes.

Q. In this paragraph, you used the phrase "before the USPTO examiner."

Do you see that?

A. I do.

Q. Is a reference cited on the face of a patent, but not substantively discussed in the prosecution and history, a reference, in your view, that is before the USPTO examiner?

ATTORNEY WILSON: Objection. Form.

THE WITNESS: If it's cited on the cover page, then I think that's the definition of -- that the reference was before the examiner.

BY ATTORNEY SHENG:

Q. Sitting here today, do you know how

many references are cited on the face of Dish's '138 patent?

A. No.

Q. If I represented to you that there were 340 references listed on the face of the patent, would you have any reason to disagree with me?

A. No.

Q. Let's assume that Dish's '138 patent has 340 references listed on the face of the patent. Is it your opinion that all 340 references listed on the face of the patent were before the USPTO examiner?

A. Yes, they were -- the examiner was made aware of those 340 references.

Q. You don't know if the USPTO examiner actually read any of the references listed on the face of Dish's '138 patent, do you?

ATTORNEY WILSON: Objection. Calls for speculation.

THE WITNESS: As a factual matter, no.

BY ATTORNEY SHENG:

Q. You don't know; right?

A. I answered your question.

Q. You don't know; right?

ATTORNEY WILSON: Same objection.

THE WITNESS: What I said was as a factual matter, I think I said as a factual matter, no.

BY ATTORNEY SHENG:

Q. Have you ever done prior art searches in the past on behalf of parties challenging a patent?

A. Yes.

Q. What is your approach generally to conducting a prior art search?

A. Well, when I've been asked to do it, it's typically been to specifically search in the academic literature. And what I typically do is I search in some digital libraries that I have access to.

Q. Let's say -- strike that.

Let's say as part of a prior art search, you were charged with a task of reviewing all 340 references on the face of Dish's '138 patent. What would your approach be?

A. I don't know.

Q. Is it fair to say that the title of the patent is one of the first things you would

look at?

A. Me personally, probably not.

Q. Why not?

A. Because in my experience, patent titles aren't uniquely informative as to the content of the patent.

Q. What about the abstract?

A. The abstract I would definitely look at.

Q. What about the claims?

A. I'm sorry, the claims?

Q. Yes.

A. At some point, sure, I would probably look at the claims.

Q. At the title abstract and claims of the prior patent listed on the face -- strike that.

If you were reviewing a patent as part of a prior art search, a prior art patent, and the abstract of the patent seemed irrelevant to the patent you were trying to invalidate, would you move on to one of the other 340 patents, or would you still review the prior art patent?

ATTORNEY WILSON: Objection. Form, scope, incomplete hypothetical.

THE WITNESS: I don't know. I

can't answer that. I mean, I think it would depend on what exactly I was looking for and what exactly the abstract said.

BY ATTORNEY SHENG:

Q. Let's go back to paragraph 27 of Exhibit 2001.

A. Sure.

Q. I'm particularly interested in this phrase you used, "especially difficult". You say that it is especially difficult to prove invalidity by clear and convincing evidence if a reference was before the examiner. What do you mean by "especially difficult"?

A. Just that in your analysis, you have to consider the fact that the patent examiner considered the reference. And so if you're trying to invalidate based on the reference that was before the examiner, you effectively have to be saying the examiner made some mistake. And I think that's difficult to do.

Q. Is Petitioner's burden of proof in these IPRs higher than clear and convincing evidence?

A. No.

Q. Have you heard of the standard "beyond a reasonable doubt?"

A. Yes.

Q. You're not applying the beyond a reasonable doubt standard in these IPRs, are you?

A. No.

Q. You're applying the clear and convincing evidence, are you sure?

A. In this declaration, what I was saying was that this is the burden that I understood that the defendants bear.

Q. Can you turn to paragraph 41 of your expert report.

A. (Witness complies with request.)

Okay.

Q. Paragraph 41, you state your understanding that claims are to be given their plain and ordinary meaning according to a person with skill in the art at the time of the invention; correct?

A. Yes.

Q. In paragraph 41, you also mention that the ITC previously construed the term "streamlets."

Do you see that?

ATTORNEY WILSON: Objection. Misstates testimony.

THE WITNESS: You guys kind of talked over each other. Could you just reask the question.

BY ATTORNEY SHENG:

Q. I made a mistake there. Strike that.

In paragraph 40, you mention that the ITC previously considered the term "streamlets."

Do you see that?

A. Yes.

Q. You conclude paragraph 40 by stating that the construction of streamlets from the ITC is not required for purposes of rendering the opinions you express in the report marked Exhibit 2001.

Do you see that?

A. I do.

Q. Your opinions don't depend on the ITC's construction of streamlets. Agree?

A. For this declaration, that is correct.

Q. What do you mean, "for this declaration"?

A. Just -- I don't know what's

ambiguous about that. I mean, for this document, that statement is true.

Q. Is the statement true for other documents?

A. We'd have to look at those other documents.

Q. Sitting here today, you have no understanding as to whether or not the ITC's construction of streamlet is relevant to -- strike that.

Sitting here today, you have no understanding whether or not the opinions you expressed in other documents or declarations depend on the ITC's construction of streamlets?

ATTORNEY WILSON: Object to the form. Misstates testimony.

THE WITNESS: It depended on it. I would have stated it in the -- my other declarations. Sitting here today, I don't recall any argument that turns on this particular construction.

BY ATTORNEY SHENG:

Q. In paragraph 42 of Exhibit 2001, you discuss the term "virtual timeline"; correct?

A. Yes.

Q. In the last paragraph -- in the last sentence of paragraph 42, you state that the term "virtual timeline" does not require a specific construction; correct?

A. Correct.

Q. It's your opinion that a person with skill in the art would understand the plain and ordinary meaning of virtual timeline; correct?

ATTORNEY WILSON: Objection. Misstates testimony.

THE WITNESS: No. That's not the opinion that I'm offering here.

BY ATTORNEY SHENG:

Q. If a term in a patent claim does not require specific construction, do you agree that the term is to be interpreted according to how a person of skill in the art would understand the plain and ordinary meaning of that term?

A. For claims that are claim terms that are not construed, that is the case.

Q. The virtual timeline does not require a specific construction; correct?

A. That's not what I am saying in paragraph 42.

Q. Doctor, I'm handing you what's

previously been marked as Exhibit 2006.

A. Thank you.

Q. Exhibit 2006 is the declaration you submitted in support of Dish's patent owner response, POR. I'll represent to you that this is the declaration you submitted in connection with the '138 patent.

Do you have any reason to disagree?

A. No.

Q. Let's go to paragraph 42 in this declaration.

A. Okay.

Q. Paragraph 42 you also discuss the virtual timeline term; correct?

A. Yes.

Q. The last sentence of paragraph 42 in this declaration, you state that the term "virtual timeline" does not require a specific construction; correct?

A. Yes.

Q. It's your opinion then that a person of skill in the art would understand the plain and ordinary meaning of the term "virtual timeline"; correct?

A. Yes.

Q. In paragraph 43, you state that a person with skill in the art would understand virtual timeline would be broad enough to include a playlist; correct?

A. Yes.

Q. And you state that the specification of the '138 patent describes two exemplary alternatives of a playlist.

Do you see that?

A. Yes, now I see that.

Q. And even though the '138 patent discloses two alternatives of a playlist, you opine that these are just non-limiting examples of a playlist; correct?

A. Correct.

Q. According to you, the bases of your opinions that these are nonlimiting examples of playlists is the use of open-ended language like, for example, it "may," to introduce these concepts; correct?

A. The basis for my opinion -- part of the basis for my opinion that these are nonlimiting examples of playlists is because of that language, the open-ended language.

Q. A person with skill in the art would

understand the use of open-ended language such as "for example" and "may" to introduce concepts to mean that the examples provided are nonlimiting. Agree?

A. I think as a general matter, yes, but you'd have to consider the specifics of the statements at issue.

Q. In paragraph 43, in the second sentence, you quote from the '138 patent. You state, "For example, the specification states that the virtual timeline, hereinafter VT 600, may comprise a file that is configured to define a playlist for a user to view."

Do you see that?

A. I do.

Q. Is it your opinion that the use of the word "may" means that the virtual timeline does not necessarily mean to define playlist for a user to view?

A. Correct.

Q. Both options are available, it may comprise something, it may not; correct?

A. It may comprise that, it may comprise something else.

Q. That is because a person with skill

in the art would understand the use of the word "may" to introduce what's next, means that what comes next is not limiting. Agree?

ATTORNEY WILSON: Object to the form.

THE WITNESS: A person of ordinary skill in the art would understand that "may" is not citing a hard and fast requirement.

BY ATTORNEY SHENG:

Q. In paragraphs 41 to 44, you discussed the term "streamlet and virtual timeline"; agree?

A. 1 through 44, let me review. Yes.

Q. In paragraph 45, you state, "I have not identified any other terms of the challenged claims of the '138 patent that require construction for purposes of rendering the opinions I express here."

Do you see that?

A. I do.

Q. There are no other claim terms in the challenged claims that require construction; correct?

ATTORNEY WILSON: Objection.

Form.

THE WITNESS: For purposes of rendering the opinions that I express in this declaration, that is correct.

BY ATTORNEY SHENG:

Q. As you sit here today, are you aware of any other claim terms in any of the patents that requires -- strike that.

Sitting here today, are you aware of any other claim terms related to any of the other ABR patents that require claim construction?

ATTORNEY WILSON: Object to the form.

THE WITNESS: For the opinions that I've offered so far, no.

BY ATTORNEY SHENG:

Q. Can we agree that for any claim term that you have not expressed an opinion regarding claim construction, that term should be given its plain and ordinary meaning to a person of skill in the art at the time of the invention?

A. Sure. Read in light of the claims and the specification, that's correct.

Q. When was the first time you became aware of any of the ABR patents, including any

patents related to the ABR patents?

A. I became aware in -- I don't remember exactly. Maybe 2017 or 2018.

Q. Which patent was that, do you remember?

A. No. It was one in this family, but I don't recall the number.

Q. Please turn to paragraph 46 of Exhibit 2006.

A. I was going to say actually I think I document the patent number in here.

Q. Okay.

A. So it's the one that I said in paragraph 46, the '444 patent.

Q. Okay. Let's go through that.

About midway through paragraph 46, you state "at the onset here." Let me know if you can find that. It's about midway through.

A. Yes, I got it. Thank you.

Q. You state, "At the onset here, I note as part of my service as an expert witness in relation to patent litigation matters related to video streaming, I had occasion to research the state of the art in video streaming in the late 1990s and early 2000s."

Do you see that?

A. Yes.

Q. Can you describe for me generally the research you conducted relating to the state of the art in video streaming in the late 1990s and early 2000s.

A. I had served as an expert witness on quite a few cases relating to aspects of video streaming and video on demand, and as a result of that work, I've had occasion to review the academic literature systems that were commercially available and a significant number of patents related to, as I say, video on demand and video streaming.

Q. Was this related to a specific case, do you recall?

A. The reference here to the Brueck patent is a reference to a specific case, but the sentence that we were speaking of at the onset here -- excuse me -- he's referring to a collection of cases.

Q. Did you do that research yourself, or did someone help you?

A. I did the research, as I recall, because this is my practice on sort of the systems and the academic literature, and someone else had

done searches of patents and provided me with patents related to video on demand, video streaming and related topics.

Q. In the next sentence of paragraph 46, you state, "As part of this research and prior to my engagement in these matters, I had previously encountered patents in the family of the ABR patents, specifically U.S. Patent Number 7,818,444, the Brueck and Hurst, around the 2016 and 2017 time period."

Do you see that?

A. I do.

Q. So earlier you stated you that first encountered one of the ABR patents in 2017 to 2018. Does this refresh your recollection that it was in 2016 to 2017 that you first encountered those patents?

A. Yes.

Q. I'll refer to the Brueck patent as the '444 patent as you do in your declaration, okay?

A. Okay.

Q. The '444 patent is in the same family as the ABR patents at issue here today; correct?

A. I believe that is correct.

Q. The '444 patent has the same specification as the ABR patents, do you know?

A. I believe that is correct.

Q. What was the context of you coming across the '444 patent in the 2016 to 2017 time frame?

A. It was being asserted as prior art against another patent.

Q. Did someone provide the '444 patent to you, or did you come across it yourself?

A. As best I recall, it was provided to me.

Q. So prior to the 2016 to 2017 time frame, you had never come across the '444 patent or any of the ABR patents; correct?

A. I believe that is correct.

Q. Staying in the same paragraph 46, in the next sentence you state, "Having done original research in adaptive streaming in the 1990s, I recall being impressed by the '444 patent, in particular, its architecture for what it termed multi-bid rate video and/or audio content streaming."

Do you see that?

A. I do.

Q. And in the next sentence you state, "The architecture included using a web server hosting sets of content files where each set represented segments, streamlets of a larger media presentation encoded in the same format but at a particular streaming bit rate."

Do you see that?

A. I do.

Q. Let's break that down. In the 2016 to 2017 time frame, you were particularly impressed by the '444 patent's use of a web server to host sets of content files; correct?

A. The use of the web servers, plural, to host content as that content had been formulated in the '444 patent.

Q. Why did that impress you?

A. Well, I remember I had a student in 2012, 2013-ish -- I don't remember exactly the time period -- who wanted to do a project on DASH, on MPEG-DASH. And I remember when I first encountered DASH, I thought this is brilliant. It's a very elegant, simple solution to the streaming problem. I mean, it was -- I mean, I was genuinely impressed. I mean, I read it and I immediately

thought wow, this is really great.

So fast forward five years or so, four years, and I see the Brueck patents and I say, Wow, these guys had the core ideas behind DASH. I thought Wow, they invented DASH. So I was impressed because it seemed to me that this was the patent that was possibly the origin of a lot of the technology that's used for streaming video today.

Q. In the 2016 to 2000 time frame, were you particularly impressed by the '444 patent's disclosure of segmenting a larger media presentation into segments?

ATTORNEY WILSON: Object to the form.

THE WITNESS: I was impressed by all of Brueck. I mean, as I say, I knew of the -- through having studied and worked with DASH, I knew of the technique of segmenting a video into discrete, uniform sized pieces and encoding -- replicating those and encoding those at multiple bit rates.

So I had seen that concept in DASH. And what impressed me was here was that idea in a patent, and that the

patent was, you know, prior to DASH.

BY ATTORNEY SHENG:

Q. I guess, Doctor, what I'm trying to figure out is what in particular impressed you about the '444 patent. So was it the using of web servers, was that included?

A. Yes, that was part of it. But it's really the whole package, as I say. It seemed to me that these guys invented DASH. That was my immediate take-away.

Q. So the use of web servers, ordinary web servers, was one of the parts of Brueck that impressed you.

Do you agree?

A. To the extent you're trying to dice out what impressed me into small chunks, as I say, my recollection is what impressed me was the package, that it was all of it. It was all of -- all the major concepts that I knew of in DASH. Now I'm learning oh, this predated DASH.

So it was the segmenting of video into small discrete sized chunks. It's the multiple encodings. It's the use of pure client-side monitoring and adaptation. The use of vanilla web servers. It was literally the whole package.

And that's -- in particular and that's important, because it literally was the whole package that impressed me. Because it wasn't, like I said, oh, my God, here is something fundamental that's missing from Brueck. It was like, Wow, Brueck has it all.

Q. So what impressed you about the '444 patent you said was the package, and the package you testified included segmenting a video into small discrete sized chunks. It included multiple encodings. It included the use of pure client side monitoring and adaptation. It included the use of vanilla web servers; correct?

ATTORNEY WILSON: Object to the form.

THE WITNESS: All of that was included in what impressed me.

BY ATTORNEY SHENG:

Q. Are there any other features disclosed in the '444 patent that you would say are included in that package that impressed you?

A. I remember I liked their coding structure, the fact that they were using a parallel set of -- they were parallelizing the encoding scheme. Just from an architectural standpoint,

that was nice. Any others? I mean, those are the things that coming to mind just sitting here today.

Q. In the last sentence of paragraph 46, you state, "While this paradigm of client adaptation in requesting of content is common for streaming media today, in particular requesting via HTTP, the '444 patent impressed me as being the earliest patent I had seen with such architecture."

Do you see that?

A. I do.

Q. Are you saying in this last sentence of paragraph 46 that the '444 patent was the earliest patent you had seen with such an architecture when you reviewed it in the 2016 to 2017 time frame, or are you saying it is today the earliest patent you had seen with such architecture?

ATTORNEY WILSON: Object to the form.

THE WITNESS: Well, this is a statement as to my reaction when I first saw -- when I first encountered the patent in the teens.

BY ATTORNEY SHENG:

Q. Is it still the case today that the '444 patent is the earliest patent you had seen with such an architecture?

A. Yes. As I say, I haven't seen anything earlier. I mean, as I say, having worked in this field, I've always been curious just to kind of understand how these things developed and when things came into existence.

In terms of the paradigm of managing the video and storing multiple copies at different bit rates and requesting via simple HTTP, I haven't seen anything earlier than the ABR patents in terms of patent art. I haven't seen -- so far, I haven't seen anything earlier.

Q. What about nonpatent art?

A. I haven't seen anything, any systems either.

Q. Are you familiar with the reference called "leaning"?

A. Called who?

Q. Leaning. Inventor Leaning, L-e-a-n-i-n-g.

A. That's a British person?

Q. I believe so.

A. Yeah, I have seen -- I think I know what you're talking about.

Q. In what context are you familiar with the Leaning reference?

A. I was asked by attorneys for Dish to look at the Leaning reference.

Q. When was this? When were you asked to review Leaning?

A. I don't recall with much precision. I think maybe during this last summer or spring.

Q. Doesn't Leaning disclose segmenting video into small, discreet-sized chunks?

A. I don't recall with Leaning sitting here today.

Q. Sitting here today, you have no recollection whatsoever as to whether Leaning discloses segmenting a video into small, discreet-sized chunks?

A. I don't recall Leaning with sufficient clarity to answer your questions sitting here today.

Q. Can you mark this as Jaffay Exhibit 1.

(Exhibit 1 was marked for identification.)

Q. Doctor, you've been handed what's been marked as Jaffay Exhibit 1. I'll represent to you that this is the Leaning reference. Do you have any reason to disagree?

ATTORNEY WILSON: Object to scope.

THE WITNESS: No.

BY ATTORNEY SHENG:

Q. Does this -- can you review, meaning the claims of Leaning?

A. The claims?

Q. You claim -- give me one second. Why don't we set that aside. We'll come back to that.

Let's go to paragraph 48.

A. Okay.

Q. Of Exhibit 2006.

ATTORNEY WILSON: We've been going for about an hour.

ATTORNEY SHENG: Do you want a break, Doctor?

THE WITNESS: I'm fine.

ATTORNEY SHENG: We can take a short break. Just remind you that you are not permitted to speak to counsel about your deposition, okay?

THE WITNESS: Sure.

THE VIDEOGRAPHER: Time is 10:07 a.m. We are now off the record.

(Recess taken from 10:07 a.m. to 10:16 a.m.)

THE VIDEOGRAPHER: It's 10:16 a.m. We are now on the record.

BY ATTORNEY SHENG:

Q. Doctor, did you speak to anybody about your deposition during the break?

A. No.

Q. If you could please turn to page 23 of your expert report marked 2006.

A. Okay.

Q. And I'd like to ask you about footnote 1. Could you read footnote 1 to yourself and let me know when you're done.

A. (Witness complies with request)

Q. "Throughout the 1990s, University of North Carolina, Duke, North Carolina State University and other schools maintained a set of facilities for distance learning and remote conferences"; correct?

A. Yes.

Q. These facilities supported live

two-way audio; correct?

A. Yes.

Q. These facilities offered live video streaming; correct?

A. Yes.

Q. These facilities offered video streaming while audio was acquired and managed separately from videos; correct?

A. Yes.

Q. Are you familiar with something called the multitask MBone?

A. Yes.

Q. What is the MBone?

A. The MBone was an overlay network that was developed by academic networking researchers in the mid-1990s to experiment with multitask content delivery.

Q. Fair to say the MBone was used for video streaming?

A. It was used for a form of video streaming, yes.

ATTORNEY SHENG: Can you mark this as Jaffay Exhibit 2.

(Exhibit 2 was marked for identification.)

BY ATTORNEY SHENG:

Q. Do you recognize this document?

A. Not off the top of my head.

Q. This appears to be an expert declaration you submitted in IPR of U.S. Patent Number 8,050,652.

Does that look right?

A. I mean, that's what it says on the cover.

Q. Do you recall being retained by Samsung as an expert in an IPR before, Doctor?

A. Yes.

Q. I'll represent to you that this is the expert declaration you submitted on behalf of Samsung in an IPR of the '652 patent.

Do you agree with me?

ATTORNEY WILSON: Objection. Foundation.

THE WITNESS: I mean, I don't recognize this sitting here today, but I see what it says on the cover, so I'll accept your representation.

BY ATTORNEY SHENG:

Q. Can you turn to the very last page of Jaffay Exhibit 2. It has your signature; right?

A. Yes.

Q. Okay. Can we agree that you were retained by Samsung as an expert in this IPR?

A. Yes.

Q. Samsung was the petitioner in this IPR; correct?

A. Yes, a variety of Samsung companies.

Q. Samsung retained you as an expert to argue for invalidity of the '652 patent; correct?

A. I actually don't recall what they retained me for, what the actual retention covered.

Q. Can you turn to paragraph 15 of Jaffay Exhibit 2.

A. Sure.

(Witness complies with request.)

Q. In the mid to late 1990s, you were part of a research group that participated in the MBone research initiative; correct?

A. Yes.

Q. In the mid to late 1990s, your research group regularly used the MBone to watch and listen to live programming streamed over the internet; correct?

A. Yes.

Q. Do you recall a Rolling Stones

concert being streamed through the MBone in 1994?

A. I do.

Q. What do you remember from that?

A. I remember that it happened. I remember people were super excited about it, and I remember that the quality was not great.

Q. Do you remember that it was, streamed, the concert -- strike that.

Do you remember the concert was held at the Cotton Bowl in Dallas?

A. No, I don't remember that.

Q. Do you recall any news that it was streamed to 50,000 fans?

A. I recall that it was a newsworthy event.

Q. Do you recall the MBone being used in the mid-1990s to stream space shuttle launches?

A. Space shuttle launches. I don't recall that.

Q. You can put Jaffay Exhibit 2 away for a bit.

A. (Witness complies with request.)

Q. Now, prior to your work in these IPRs, you were aware of a company called Real Network. Is that correct?

A. Yes.

Q. And you are aware that Real Network made one of the early commercial video streaming players on the market; correct?

A. Players, yes.

Q. A commercial video streaming called Real Video; is that right?

A. Yes.

Q. Real Network introduced its real video streaming player in 1997; correct?

A. I don't recall that detail, but that generally sounds about right.

Q. Let's go to page 40 of Exhibit 2006.

A. That's the --

Q. That's your declaration in support of Dish's TOR?

A. TOR, okay. I'm sorry, I missed the page number.

Q. Page 40.

A. Forty, thank you.

Q. Footnote 9. Does footnote 9 refresh your recollection as to whether or not the real video streaming player was released in 1997?

A. Yes, thank you.

Q. Real Network was a recognized early

pioneer in the development of multimedia players; correct?

A. I believe that's a fair statement.

Q. It was a recognized leader in that space; fair?

A. In 1997, yes.

Q. You would agree that in the late 1997s, Real Network's video streaming player was well known to people in the video streaming community; correct?

A. Yes.

Q. A person of skill in the art in 1997 would have been aware of the Real Video streaming player; correct?

A. Yes.

Q. A person of skill in the art would have considered Real Network's video streaming player part of the state of the art with respect to Dish's ABR patents; correct?

A. With respect to Dish's ABR patents? Sorry, I don't understand the question.

Q. Is Real Network's video streaming player in the state of the art?

A. In 1997, yes.

Q. In 1997 -- strike that.

In 1997, Real Network's video streaming player was part of the state of the art; correct?

A. Yes.

Q. Could you go to paragraph 11 of Exhibit 2006. Again, that's the declaration you submitted in support of Dish's POR for the '138 patent?

A. Okay. I'm there.

Q. Can you read paragraph 11 to yourself and let me know when you're done.

A. (Witness complies with request.) Okay, I'm ready.

Q. What does real time mean in paragraph 11 of your report?

A. As I'm using that term here, real time meant that the streams were -- the media was transmitted as it was acquired with minimal delay.

Q. Starting in the late 1980s, you developed network and operation system technology to enable the real time transfer of streams of audio and video data across the internet; correct?

A. Correct.

Q. Starting in the late 1980s, you developed media encoders, media players and network communication protocols for adaptive transmission

of live audio and video data on the internet; correct?

A. Work on media, the work as a whole over time involved all of these things. In the late 1980s, we weren't doing work in media encoders.

Q. Paragraph 11 says you work on the development of media encoders, doesn't it?

A. Yes, as I say, the broader project over time considered all of the items that are listed here in that sentence.

Q. So starting in the late 1980s, you developed media encoders; correct?

A. The project started in the late 1980s. The development of media encoders came later.

Q. When?

A. I think we did the first codec in '92, '93, maybe. The first software codec in '92 or '93.

Q. So beginning in around 1992 and 1993, media encoders for adaptive transmission of live audio and video data on the internet were known; true?

A. No.

Q. You testified that you were working on a project starting in 1992, 1993 developing media encoders; correct?

A. Correct.

Q. Okay. So when were media encoders for adaptive transmission applied data on the internet known?

A. The media encoders were not adaptive. They were just static encoders. They had nothing to do with adaptation. The adaptation was done really through the development of these -- what's labeled here as the network communication protocols. That was the adaptive part.

Q. So referring back to paragraph 11 of your report, is it incorrect where you state "The development of media encoders"?

A. No. The work did involve over time the development of media encoders, media players, and network communication protocols.

Q. When were media encoders for adaptive transmission applied audio and video data on the internet known?

ATTORNEY WILSON: Objection. Form.

THE WITNESS: I don't know off the

top of my head. I'd have to go and research that. I don't know the -- I don't have a date I can give you sitting here today.

BY ATTORNEY SHENG:

Q. Is it before 1995?

ATTORNEY WILSON: Objection. Form.

ATTORNEY SHENG: What's the objection, Counsel?

ATTORNEY WILSON: The witness had just testified -- well, misstates testimony. The witness just testified that media encoders were not involved in the adaptive transmission.

BY ATTORNEY SHENG:

Q. Go ahead, Doctor. Could you answer the question?

A. Could you just restate it or read it back.

Q. Sure. When media encoders for adaptive transmission -- sorry.

When were media encoders for adaptive transmission of live audio and video data on the internet known? When did they become known?

A. So if you're asking about adaptive media encoding, I haven't researched that recently, so I don't have a date that I can give you, sitting here today.

Q. Sitting here today, are you able to tell me if it was before or after 1995?

A. No. Off the top of my head, I can't think of any project that was doing adaptive media encoding, in particular for video before 1995. It may have existed, but I can't think of an example sitting here today.

Q. But you yourself started working on projects related to media encoders for adaptive transmission of live and audio -- live audio and video beginning in 1992 or 1993. Is that correct?

A. What I was working on was adaptive transmission of live audio and video. That work included the development of media encoders. The encoders, as I say, were not adaptive. All the adaptation was done in the network, through the development of network protocols.

Q. Can we agree that in the late 1980s, media players for adaptive transmission of live audio and video data on the internet were known?

A. I can't think of any in the late

1980s.

Q. When was the earliest media player for adaptive transmission of live audio and video data on the internet, that you can recall?

A. Well, the one that I can recall was the one we developed, and we first demonstrated a player for adaptive live transmission in -- I think we first demonstrated it publicly in around '92.

Q. Would that media player you developed and demonstrated in 1992 require media encoders for adaptive transmission of live audio and video data?

A. Yeah, at that time it was using hardware -- using a hardware encoder.

Q. Okay. So by 1992, media encoders for adaptive transmission of live audio and video data on the internet were known; correct?

A. No, no. What was known was just vanilla media encoders. They had nothing to do with the adaptation. All of the adaptation worked on the stream that came out of the media encoder. The media encoder was in no way adaptive.

Q. Can we agree that in the late 1980s, network communication protocols for adaptive transmission of live audio and video data on the

internet were known?

A. Not in the late 1980s. It took some time to develop those.

Q. But starting in the late 1980s, the focus of your research was the development of network and operating system technology to enable the real time transfer of streams of audio and video data across the internet; correct?

A. Correct.

Q. And your research involved, among other things, the development of media encoders, media players and network communication protocols for adaptive transmission of live audio and video data on the internet; correct?

ATTORNEY WILSON: Object to the form.

THE WITNESS: Assuming you read that correctly, yes.

BY ATTORNEY SHENG:

Q. And your work culminated in your research group developing some of the first video conferencing systems for the internet; correct?

A. Correct.

Q. And several of the papers that you authored -- that you authored -- strike that.

Several of the papers you authored by yourself and members of your research group won awards for their technical contributions; correct?

A. Correct.

Q. Okay. Can we turn to paragraph 12 of your report that's marked 2006.

A. Yes.

Q. Paragraph 12 you state that in 1991, IBM supported aspects of your research at the University of North Carolina.

Do you see that?

A. I do.

Q. Can you describe IBM's involvement in that research.

A. Sure. IBM loaned a senior engineer to my research group. So there was a member of IBM who was essentially in residence at UNC, and IBM donated a hardware, in particular, hardware codecs and computers for use in the project.

Q. So IBM loaned you a senior engineer; correct?

A. Yes.

Q. And he was a resident at UNC, you said?

A. Yes. He was in residence at UNC.

Q. What does that mean, "in residence"?

A. He had an office in the building, in the computer science department, and I think at that time he was even teaching a class. So he was like a visiting faculty member.

Q. Your work with IBM resulted in a patent on adaptive media streaming being issued to IBM at the University of North Carolina; correct?

A. Correct.

Q. That was U.S. Patent Number 5,892,754; correct?

A. That's my recollection.

Q. I'll represent to you that the '754 patent is titled "User Controlled Adaptive Flow Control For Package Networks."

Does that sound right to you?

A. I haven't looked at that in quite some time, but I'm assuming you read that correctly.

Q. You have no reason to disagree with me?

A. No.

Q. You would agree with me that it was known as early as 1991 that you can adapt bit rates from streaming; correct?

ATTORNEY WILSON: Object to the form.

THE WITNESS: It was known -- as I say, by the time we developed and demonstrated our video conferencing system in 1992, it was known that you could -- how can I say it? You could manipulate the stream coming out of -- the bit stream coming out of a codec to attempt to adapt the transmission of that stream to deal with network congestion.

BY ATTORNEY SHENG:

Q. That's what your patent with IBM was related to; correct?

A. I don't really recall much about the patent. I thought the patent was actually about ways in which performance information could flow up and down the network stack and how that information could be used for adaptation, but I really don't recall much about that patent.

Q. So in 1992, it was known that you could manipulate the stream coming out of the bit stream, coming out of the codec to attempt to adapt the transmission of that stream to deal with network congestion; correct?

A. For at least the codec that we were using, that is correct.

Q. The answer is yes?

A. With the qualification that when you say "codec," all the work we did was specific to a singular codec.

Q. Was that codec publicly available?

A. It was a piece of hardware, and the hardware was commercially available.

Q. In the course of your work with IBM, did you come across an IBM video streaming system called Bamba, B-a-m-b-a?

A. If I did, I don't believe -- I don't recognize that name.

Q. You have no recollection of the Bamba media streaming system?

A. As I said, I knew of work that IBM was doing on what they called media streaming, but that name is not -- I don't recognize that name, sitting here today.

Q. Do you recall an article by an author named Willebeek, W-i-l-l-e-b-e-e-k, Willebeek?

A. I know of an individual called Willebeek. I don't know what article you're

referring to.

Q. Who is Willebeek?

A. He was a -- the Willebeek that I knew was a networking researcher.

Q. Can you mark this as Jaffay Exhibit 3.

(Exhibit 3 was marked for identification.)

ATTORNEY WILSON: Object to the scope.

BY ATTORNEY SHENG:

Q. Do you recognize this document?

A. No.

Q. This appears to be an expert declaration you submitted in an IPR of a U.S. Patent Number 9,742,824; correct?

A. That's what it appears to be.

Q. And you were retained -- do you recall being retained by Amazon as an expert in this IPR?

ATTORNEY WILSON: Standing objection as to the scope of this document.

THE WITNESS: I recall being retained by Amazon.

BY ATTORNEY SHENG:

Q. Amazon was a petitioner in this IPR; correct?

A. Yes.

Q. Amazon retained you as an expert to argue for invalidity of the '824 patent; is that fair?

A. I don't recall the patent number, but I recall that Amazon asked me to help with an IPR.

Q. That's your signature on the very last page of Jaffay Exhibit 3?

A. Yes.

Q. And I'll refer to this IPR as the Amazon IPR; okay?

A. Sure.

Q. Paragraph 61, turn to paragraph 61, please.

A. (Witness complies with request.)

Got it.

Q. Paragraph 61 references an article titled "Bamba audio and video streaming over the internet."

Do you see that?

A. I do.

Q. The author of this article is Willebeek.

Do you see that?

A. I do.

Q. And this Willebeek article was published in March 1998 in the IBM Journal of Research and Development. Agree?

A. That's what I state here in this declaration.

Q. Is this author, M.H. Willebeek, the same Willebeek that you recalled a minute ago?

A. Yes.

Q. In the Amazon IPR, you relied on this Willebeek article as a prior art reference to invalidate the '824 patent; correct?

ATTORNEY WILSON: Objection. Relevance, scope.

THE WITNESS: I don't recall this reference sitting here today, and I don't recall -- I don't recall the details of this case. This is something I haven't seen or thought about in over two years.

There's clearly a reference to Bamba here. I don't recall how I was using Bamba.

BY ATTORNEY SHENG:

Q. Sure. In paragraph 61, you state, "Willebeek is relevant prior art at least because it was listed in an information disclosure statement during prosecution of the '824 patent."

Do you see that?

A. I do.

Q. What does this statement mean to you?

A. Well, as part of the prosecution of a patent, patent applicants submit what I understand are called information disclosure statements where they make the patent office aware of, for example, prior art that they think is relevant to their patent. At least that's my understanding.

Q. Okay. And here you are acknowledging that Willebeek was listed in an information disclosure statement during prosecution of the '824 patent; correct?

A. That's what it says. I don't really recall many of the specifics here.

Q. In the very last sentence of paragraph 61, you state, "The examiner did not substantively consider Willebeek during

prosecution."

Do you see that?

A. I do.

Q. What do you mean by that statement?

A. I couldn't tell you, sitting here today. As I said, I don't really recall the details of the analysis that was done here.

Q. What does it mean when an examiner did not substantively consider a reference during prosecution? What does that mean?

ATTORNEY WILSON: Objection. Relevance, scope.

THE WITNESS: Again, as I'm stating it in this declaration, I don't recall the point that I was making here.

BY ATTORNEY SHENG:

Q. You would agree that just because a reference is made in an information disclosure statement does not mean that the examiner substantively considered the reference during prosecution; correct?

ATTORNEY WILSON: Object to form.

THE WITNESS: I don't know what the rules are with the PTO, if they're required to consider references listed on

an information disclosure statement or not. So I don't know that I can answer one way or another.

BY ATTORNEY SHENG:

Q. What is your belief? Is a patent that is listed in an information disclosure a reference that was substantively considered by the patent examiner during prosecution?

A. I don't have any general belief as to that. If I'm trying to understand an issue like that, I would typically consider the entirety of the file history.

Q. Sitting here today, you have no position whatsoever as to whether or not the examiner substantively considered a reference that is listed in an information disclosure statement?

ATTORNEY WILSON: Objection. Scope. Asked and answered.

THE WITNESS: As it relates to the '824 patent, as I say, I just don't recall any of the details of what transpired during the prosecution of the '824 patent.

BY ATTORNEY SHENG:

Q. Was Willebeek cited on the face of

the patent, do you recall?

A. I don't recall.

ATTORNEY SHENG: Could you mark this as Jaffay Exhibit 4.

(Exhibit 4 was marked for identification.)

ATTORNEY WILSON: I'll have a standing objection to the scope of this document.

BY ATTORNEY SHENG:

Q. Agree with me that this is the '824 patent we've been talking about?

A. It appears to be.

Q. I'll show you my copy, but you can go to yours. I flagged where I believe Willebeek is, it's on page 7 of the '824 patent, on page 7.

A. Okay.

Q. The third-to-last reference. You can find it yourself since I flagged it for you.

A. Thank you, I appreciate that.

Q. Let me know when you're on page 7. If you flip seven pages or look at the top of page 7, there's a -- let's see, the third-to-the-last reference cited in the '824 patent is the Willebeek article.

Do you see that?

A. I do.

Q. You agree that the Willebeek article is cited on the face of the '824 patent; right?

A. If these References Cited section is considered the face of the patent, then yes. I believe it's cited here in terms of references cited. In the References Cited section.

Q. In the Amazon IPR, you argue that the examiner did not substantively consider Willebeek during prosecution; correct?

A. It seems that I made that statement, but I don't recall what the basis of that statement was.

Q. In the Amazon IPR, you argue that the examiner did not substantively consider Willebeek, even though Willebeek is cited on the References Cited section of the patent; correct?

A. I mean, I said what I said in this declaration. As I said, I don't recall the basis for that statement, the statement about the examiner substantively considering the reference.

Q. The answer is yes?

A. Could you just ask the question again.

Q. In the Amazon IPR, you argued that the examiner did not substantively consider Willebeek, even though Willebeek is cited on the References Cited section of the patent; correct?

A. I made a statement that, in my opinion, the examiner didn't substantively consider it. And as I say, I don't recall the basis for that statement.

Q. I don't think you're answering my request, Doctor. In the Amazon IPR, you argued the examiner did not substantively consider Willebeek, even though Willebeek is cited on the References Cited section of the patent. Yes or no?

A. You are stating a statement attributing to me that I did not state. I did not have a statement about Willebeek being on the cover page of the patent. I definitely made the statement that, in my opinion, the examiner didn't substantively assess it, but I said nothing about the cover page of the patent.

Q. Knowing now that Willebeek is cited on the '824 patent, does that change your opinion as to whether or not the examiner would have considered Willebeek during prosecution?

A. I can't answer that question without

going back and reviewing the analysis that I did in the Amazon declaration.

Q. In these IPRs where you're representing patent owner Dish, you argue in your expert report that proving invalidity is especially difficult if a reference is cited on the face of the patent, because it is presumed that the examiner considered the reference prior to allowing the claims; correct?

A. I think we've gone over that. That's a statement in the -- that was a statement in the POPR, this declaration.

Q. The answer is yes?

A. That was a statement in the POPR declaration.

Q. Yes or no?

A. What's the -- how is that not an answer to your question? What's the question?

Q. Here in these IPRs where you're representing the patent owner Dish, you argue in your expert report that proving invalidity is especially difficult if a reference is cited on the face of the patent because it is presumed that the examiner considered the reference prior to allowing the claims. Yes or no?

ATTORNEY WILSON: Objection to the form.

THE WITNESS: I made that statement in my declaration for the POPR. That's -- that is absolutely a statement that I made.

BY ATTORNEY SHENG:

Q. Between the Amazon IPR and these IPRs, taking different positions on the same issue; fair?

A. No. I disagree.

Q. Why?

A. First of all, I have -- I'm not able to opine today on what was being argued in the Amazon IPR. I don't recall the analysis there, and I don't recall the basis for the statement. So I don't see -- on the face of it, I don't see any contradiction.

Q. Doctor, this is your chance to explain to the board the inconsistency. Do you have anything else to explain why you took one position in the Amazon IPR and a different position in these IPRs?

ATTORNEY WILSON: Objection. Argumentative, form.

THE WITNESS: I'm not seeing any inconsistency here, and if you want me to explain it to the board, I would be happy to do so. I would go back and review the analysis that was done in the Amazon case, and I'm quite confident there would be no inconsistency.

BY ATTORNEY SHENG:

Q. We'll flag that. If we have time at the end of the day, I might have you do that.

Do you have the '824 patent still in front of you?

A. Yes.

Q. Do you agree there are hundreds of references cited in the References Cited section of the '824 patent?

A. There seems to be quite a lot.

Q. Do you agree that it's unlikely that an examiner would have substantively reviewed hundreds of references cited on the face of the patent?

A. I don't know.

Q. You have no opinion one way or the other?

A. For this particular patent, no.

Q. For any patent, Doctor, a patent has hundreds of references cited on the face of it. Can we agree that it's unlikely that an examiner would have substantively reviewed all hundreds of those references?

ATTORNEY WILSON: Object to the form.

THE WITNESS: In my experience, often when patents have such a long list of references cited, it's because it's a -- there's been a long sequence of continuations. So the prosecution has occurred over many, many years.

So I mean, at the end of the day, I'm not going to speculate on, for example, for the '824 patent, what the examiner did or didn't consider.

BY ATTORNEY SHENG:

Q. It's possible that one of the references cited on the '824 patent was a smoking gun, the examiner just missed it.

Do you agree?

ATTORNEY WILSON: Object to the form.

THE WITNESS: I don't understand

your question.

BY ATTORNEY SHENG:

Q. It's possible that one of the references cited on the '824 patent was invalidating, an examiner dismissed it.

Do you agree?

A. I don't know if it's possible or not. Sitting here today, I don't recall anything about the prosecution of the '824 patent.

Q. You can put that away. I'm going to turn to paragraph -- let's go back to Jaffay Exhibit 3, which is the declaration you submitted in the -- in the -- which one is this? Give me a second. The Amazon IPR.

A. Okay.

ATTORNEY WILSON: I'm sorry, where are we?

ATTORNEY SHENG: Paragraph 75 of Jaffay Exhibit 3.

THE WITNESS: Okay.

BY ATTORNEY SHENG:

Q. Do you see the section titled "Overview of Willebeek"?

A. I do.

Q. Can you read paragraph 75 to

yourself and let me know when you're done.

A. (Witness complies with request.)

Okay, I'm done.

Q. Bamba was a media streaming system -- strike that. Let me start over.

Bamba was a media streaming system that delivered audio and video over low bandwidth modem connections with the use of standard compression technologies; correct?

A. That seems to be a quote from Bamba.

Q. It's a quote from Bamba and a quote from yourself too; right? You're quoting Bamba; correct?

A. I believe -- I believe that is correct.

Q. Bamba was a media streaming system delivering audio and video over low bandwidth modem connections with the use of standard compression technologies. Agree?

A. That's what it says in the declaration. As I say, I don't really recall really any of the details of what Bamba was or how it worked.

Q. Can you turn to the last page, Doctor, of Exhibit 3.

A. Okay.

Q. You state, "I hereby declare that all statements made here on my own knowledge are true and that all statements made under information and belief are believed to be true," and you go on to state that if you make willful false statements and the like, it will be punishable by fine, imprisonment or both.

Do you see that?

A. I do.

Q. Bamba was a media streaming steam that delivered audio and video over low bandwidth modem connections for the use of standard progression technologies. Do you agree?

A. That's what I said in August of 2022. I assumed that was a correct statement when I signed this declaration.

Q. The Bamba media streaming system was fully implemented and deployed both internally at IBM and externally by 1998; correct?

A. I can't confirm that. All I can say is that's what I stated, and I undoubtedly believed that was true in August of 2022.

Q. It was conventional by 1998 to stream audio and video from the web; correct?

A. Yes.

Q. It was conventional by 1998 to stream audio and video from both stored and live sources on the web; correct?

A. Yes.

Q. Can you turn to paragraph 76 of the expert declaration in the Amazon IPR. Please read paragraph 76 to yourself and let me know when you're done.

A. (Witness complies with request.) Okay.

Q. In 1998, the Bamba media streaming system included a client equipped with appropriate Bamba software that was able to communicate with a server and receive the Bamba audio and video file; correct?

A. I don't -- I don't have a recollection of that sitting here today, but that is what I stated, and I assume that that was correct as of the time I am sure this work.

Q. In 1998, the server in the Bamba media streaming system was a standard HTTP web server; correct?

A. Again, I don't have any recollection of that today, but that's what I stated in August

of '22, and I assumed that was correct then.

Q. Does this refresh your recollection at all whether or not the Bamba media streaming system included a client equipped with appropriate Bamba software would be able to communicate -- sorry, strike that.

Your declaration in the Amazon IPR does not reflect -- refresh your recollection at all whether or not in 1998 the server in the Bamba media streaming system was a standard HTTP web server?

A. Well, when you say your declaration doesn't reflect -- it doesn't refresh, we've looked at, what, four sentences in here. If you want to refresh my memory, I would want to go back and read this declaration.

To really refresh my memory, I'd have to read this declaration again and read the Bamba reference.

Q. Sitting here today, you don't dispute that in 1998, the server in the Bamba media streaming system was a standard HTTP web server; correct?

A. No, I don't dispute any statements that I made in here. I assume that I did a good and correct analysis in August of '22.

Q. Good. You don't dispute that the Bamba media streaming system used an ordinary server in 1998; correct?

ATTORNEY WILSON: Objection. Asked and answered.

THE WITNESS: No, I don't dispute it. I mean, it sounds like I was doing a traditional progressive download.

BY ATTORNEY SHENG:

Q. You would agree that the underlying transfer protocol used by HTTP is TCP/IP; correct?

A. Yes.

Q. TCP/IP provided reliable end-to-end network connections; correct?

A. Yes.

Q. And this was known in 1998; correct?

A. Yes.

Q. Dish didn't invent the idea of using TCP/IP in a video streaming system; correct?

ATTORNEY WILSON: Object to the form.

THE WITNESS: For their particular formulation of video streaming they did, but for using TCP/IP, HTTP over TCP/IP for progressive download, no, they didn't

invent that.

BY ATTORNEY SHENG:

Q. You said "progressive download"; right?

A. Because that's what -- that's what the last sentence is telling to me that says if a banned Bamba clips, which is just doing video clips, is selected, the server transforms the clip to the client as fast as TCP/IP can move it, and the clip begins decoding and displaying the Bamba file as soon as the first few bytes arrive. That's the progressive download.

Q. Can we agree that Dish did not invent the idea of using the standard HTTP web server on a video streaming system?

A. For streaming via progressive download, we can agree.

Q. You keep caveating your answers by saying "progressive download." I'm just trying to understand, what is your bases for saying that Bamba was limited to progressive downloads?

A. I didn't say Bamba was -- I didn't say Bamba was limited to anything. I'm just simply saying that what's described here is the use of HTTP for what to me reads like progressive

downloading.

Q. Did Dish invent the idea of using a standard HTTP web server in nonprogressive download video streaming systems?

ATTORNEY WILSON: Object to the form.

THE WITNESS: For Dish's particular construction of multi-bit rate streams, I don't think that had existed -- delivering those over to HTTP, I don't think had existed prior to the ABR patents.

BY ATTORNEY SHENG:

Q. Okay. In the Bamba media streaming system, the server transfers the video clips to the client as fast as TCP/IP can move it; correct?

A. Yes.

Q. And the client begins to decode and display the Bamba files as soon as the first few bytes arrive; correct?

A. Correct.

Q. And in your opinion, this is describing a progressive download system?

A. Yes.

Q. If a server transfers the video clip

to the client as fast as TCP/IP can move it and the client begins to decode and display the Bamba files as soon as the first few bytes arrive, this enables the fast startup time for the video stream; correct?

A. It may.

Q. Can you turn to paragraph 42. I'm sorry, 142.

A. (Witness complies with request.) Okay, I'm there.

Q. If you can read paragraph 142 to yourself and let me know when you're done.

A. Okay. (Witness complies with request) Okay. I've read it.

Q. In 1998, a base requirement of the Bamba streaming system is a function within the WWW standard HTTP-based client server architecture; correct?

A. And I can't confirm that. All I can say is that that's what I said in 2022, and I assumed that was correct then.

Q. Indeed, in 1998, the Bamba media streaming system was designed to stream clips from standard HTTP web servers; correct?

A. Again, I can't independently confirm that, but that's what I said in 2022, and I assumed that was correct then.

Q. And in 1998, the Bamba media streaming system was designed to stream video clips using communication mechanisms provided by the HTTP protocol; correct?

A. I can't independently confirm that today, but that's what I said in 2022, and I assumed it was correct then.

Q. Just set that exhibit aside.

A. (Witness complies with request.)

Q. Have you heard of the term -- well, Andrew, I expect this next line to go about a half hour. So I defer to the doctor whether or not --

A. I'm fine.

Q. You're okay?

A. Yes.

Q. All right. Very good.

Doctor, have you heard of the term "media scaling" in the context of video streaming?

A. Yes.

Q. What is media scaling in the context of video streaming?

A. Media scaling typically referred to

changing the bit rate of a media stream as you were streaming it.

Q. Have you heard of bit rate media scaling?

A. That sounds more specific than my recollection. So maybe. That's, you know...

Q. Fair to say that media scaling involved changing the bit rate of a video stream based on changes in bandwidth?

A. That was the purpose of it. My recollection was it was a set of techniques that you used to change the bit rate on the fly as you were streaming media to deal with network congestion.

Q. Have you heard of packet rate media scaling?

A. Packet rate, sure.

Q. What is packet rate media scaling?

A. Well, none of these terms I think are necessarily standard adopt terms, but packet rate scaling, as I understand the term, which is something that we worked on, was simply changing how you partition a stream into network packets to make smaller or bigger packets.

Q. When you say, "partition a stream

into smaller packets," is that similar to breaking down a stream into smaller segments?

A. No.

Q. How is it different?

A. There's no -- you're not segmenting the media. You're having a stream, a constant stream of data, and you're just changing how much of the data you put into a packet.

Q. So let's go back to Exhibit 2006.

A. Okay. That's the declaration --

Q. Yes.

A. -- in the POR?

Q. Yes.

A. Thank you.

Q. Let's go to paragraph 12?

A. Twelve, okay. I'm there.

Q. In paragraph 12, you state that your work in video conferencing and adaptive streaming research attracted the attention of industry groups.

Do you see that?

A. Yes.

Q. And you agree that video conferencing is a form of video streaming. Agree?

A. It's a particular form of video

streaming, yes.

Q. One of the industry groups that was attracted by your work in video conference and adaptive streaming research was Intel?

A. Yes.

Q. In paragraph 13, you discuss the work controlled a video conferencing product called ProShare.

Do you see that?

A. Yes.

Q. What was ProShare?

A. ProShare was a predecessor of things like Zoom and Teams. It was a system that allowed a form of what today I think we typically call screening sharing. I don't actually remember what we called it. That term didn't exist then.

So it was a collaboration tool. So it had video conferencing, and it had a form of screen sharing.

Q. ProShare was a commercially available video conferencing system in the 1990s. Agree?

A. Yes.

Q. And the ProShare system offered video streaming; fair?

A. Within the context of video conferencing, yes.

Q. In paragraph 13, you state that you collaborated with researchers at the Intel Architecture Labs to modify the ProShare system.

Do you see that?

A. Yes.

Q. Who was part of that research team, do you remember?

A. The names of the people at Intel?

Q. Sure.

A. The only one that I remember is a guy named Gunner -- I want to say it's like Deniles, and don't ask me how to spell it. It's kind of like Daniels, but it's not Daniels.

Q. Was anyone else from the University of North Carolina on the team besides you?

A. Yes.

Q. Who?

A. The main student, as I recall, was a fellow by the name of Peter Nee [phon.].

Q. So part of that research team that worked to modify the Intel ProShare system included a student from the University of North Carolina; correct?

A. Yes.

Q. When you say "student," is that a graduate student?

A. Correct.

Q. Do you remember what department he was in?

A. He was using my department. He was my graduate student. He was in the Department of Computer Science.

Q. In paragraph 13, you state that you used the technology developed in your research lab at UNC for adaptive media transmission to modify the ProShare system.

Do you see that?

A. You're paraphrasing, but I see what you're reading from, and that's an accurate statement.

Q. Can you describe for me how your team was able to use the technology you developed for adaptive media's transmission at UNC to modify the ProShare system.

A. There had been another student who had done a dissertation on particular types of media adaptation, and we were essentially taking the adaptive transmission techniques that that

student had worked on and put them into ProShare. And the two techniques, I think, at the time were called packet scaling, and I don't remember what to call the second one. I think it might have been something like bit rate scaling or bit scaling.

Q. In what ways did your research team end up modifying Intel's ProShare system?

A. Well, ProShare was -- when we started the project, ProShare was an ISDN product. So it required a particular type of telecommunication circuit to work. And through the use of that circuit, it got dedicated bandwidth. I mean, it was a point-to-point connection with guaranteed bandwidth, as we would say today.

So they wanted to migrate -- they wanted to see if ProShare would work over the unwashed internet, and, of course, it didn't. So we worked with them to put -- to adapt it, to have a TCP/IP stack so it would work over the internet, and then we developed with them an application layer protocol that did the media adaptation.

Q. What do you mean by "media adaptation"?

A. Well, there was a shim in there that would try and estimate the available bandwidth

between -- so ProShare is a point-to-point, at least when we started, it was a point-to-point system.

So there was a shim that would attempt to estimate the available bandwidth on the connection to the remote peer and try and feed that information back to the sender that would then adapt the way they were transmitting media.

And so both of this happened in both directions, because both end points were sender and receiver because it was video conferencing. So it was doing essentially sender-based adaptation based on feedback from the recipient.

Q. What is shim?

A. Shim, it's just a piece of jargon that says it was code that was inserted into the network stack. It's code that you would not normally find there.

Q. So you inserted code in the network stack of the ProShare system to enable media adaptation; is that fair?

A. Well, no. What I would say is that there was a whole end-to-end solution for media adaptation. Part of it was the shim. So this is a point-to-point system. Each end point is adapting

the media that they transmit, and the adaptation was based on information that was acquired by this shim code and transmitted back to the sender.

Q. When you say "media adaptation," do you mean adapting a bit rate for the media?

A. We did something that we called adapting the bit rate, but it was not adapting the bit rate as that term is understood today.

Q. You did something that you called adaptive bit rate?

A. I think that's what we called it. I don't remember the name that we used, but the point is as bit rate adaptation is understood today, this is not what we were doing.

Q. What's the difference?

A. The difference is bit rate adaptation today means you change the codec. You generate a stream of lower bits per second. Here, again, this was a hardware codec, and it's -- for a whole variety of reasons, it's very difficult. You can't change it in real time.

So the adaptation that was done was essentially to throw away data, to take part of the bit stream generated by the codec and just not transmit it. So the codec is generating a single

bit rate throughout, and we're just throwing data away at one of the end points and not transmitting them.

Q. What were the challenges, if any, your team faced when attempting to modify Intel's ProShare system to include the adaptive media transmission technology you developed at UNC?

A. I mean, I don't recall much about the development efforts. I mean, as I say, this thing started nearly 30 years ago. The challenges were, that I recall, was definitely working with the codec because it was a hardware codec, and you couldn't -- for all intents and purposes, you couldn't change the rate at which the codec encoded video. The video just came out as a set bit stream. You couldn't change it.

And so you had to parse the bit stream to try and understand what in the bit stream you could get rid of and what you couldn't.

And then just the usual headaches of building an application layer protocol and, you know, all of the testing and trying to make this thing work.

Q. Earlier you were describing the differences between media, adapting media -- strike

that.

Earlier you were describing the differences in adapting bit rates back then versus adapting bit rates today. Can we agree that when you were modifying the Intel ProShare system, the adapting bit rate technique would result in the receiver getting a lower bit rate than a congested environment; fair?

ATTORNEY WILSON: Objection to form.

THE WITNESS: It would certainly receive less data, but I think the point is that the bit rate at which the video was being coded never changed.

BY ATTORNEY SHENG:

Q. But the receiver would receive media at a lower bit rate in a congested environment; fair?

A. I would say it would receive less data.

Q. And receiving less data means it would receive media at a lower bit rate. Agree?

A. No. I think that's misleading.

Q. How so?

A. Because as I say, the bit rate of

the video is at terms understood never changed.

Q. Were you successfully able to modify the Intel ProShare system to implement adaptive media streaming technology?

A. Yes.

Q. I think we're on Jaffay Exhibit 5.

(Exhibit 5 was marked for identification.)

Q. I included highlighting in Jaffay Exhibit 5. That's my own highlighting.

A. Okay.

Q. But can we agree that Jaffay Exhibit 5 is an article you authored in 1997 titled "The performance of two-dimensional media scaling for internet video conferencing"?

A. That's what it appears to be.

Q. In this 1997 article, you discussed your modification of the Intel ProShare system to implement the adaptive media streaming technology you developed at UNC; correct?

ATTORNEY WILSON: Objection. Foundation.

THE WITNESS: This does have, as I recall -- and I'm sure it describes what the adaptations were. I think the point

of the paper was really demonstrating that the -- that the adaptations were successful.

BY ATTORNEY SHENG:

Q. Fair enough. Let's start on page 3. There is a section in the left column titled "System Description."

Do you see that?

A. Yes.

Q. In the first sentence under Section 3, System Description, you disclose that you were experimenting with the suitability of adaptive scaling schemes.

Do you see that?

A. Yes, sorry. I was -- yes, I see that.

Q. So the answer is yes, you were experimenting with the suitability of adaptive scaling schemes; correct?

A. Yes.

Q. And as part of your experiments, you modified Intel's ProShare videoconferencing system, support one- and two-dimensional media scaling; correct?

A. Yes.

Q. On page 3 at the top of the column on the right, you state that the ProShare system had many attributes that were well suited for your experiment; correct?

A. Yes.

Q. You state that the version of the ProShare system that was commercially available in 1997 generated low bit rates, two-way audio and video streams; correct?

A. I don't recall that, but that's what the paper states.

Q. Does two-way audio and video streams mean that the audio is streaming to the user separately from the streaming from the video?

A. I'm sure that's described in the paper here. I believe the -- I mean, the scaling techniques that we worked on were originally motivated by the desire to treat audio and video separately. And I just don't recall if we ended up -- if that was possible in ProShare or not.

Q. Separate from this article, do you agree generally that two-way audio and video streams means that the audio is streamed to the user separately from the stream from the video?

A. No.

Q. What does two-way audio and video streams mean?

A. It just means bidirectional, that both end points are transmitting audio and video.

Q. Do you recall in the ProShare system that there was two-way audio and video streams?

A. Yes, I mean, both participants in a call had a ProShare system and both of them -- each transmitted audio and video to the other. I mean, it was video conferencing.

Q. And you recall the ProShare system implemented audio -- strike that.

And you recall the ProShare system streamed audio separately from video; is that correct?

A. That detail I don't recall off the top of my head, but I assume if that was done, that would have been described in this paper.

Q. You also state that the ProShare system was designed to operate at three preset fixed data rates.

Do you see that?

A. Yes.

Q. In 1997, the ProShare system was designed to operate at one data rate for ISBN or LAN operation, L-A-N operation, and two others for

LAN operation only. Agree?

A. I don't remember that detail, but that's certainly what the paper says.

Q. In 1997, what was the data rate of ISBN, do you recall?

A. As I recall, it was scalable, depending on how many -- what were they called? There was a BRI and a PRI or A channels and D channels. I think it was scalable, the units of like 64 kilobits per second.

Q. In 1997, what was the typical data rate for LAN?

A. In 1997, probably typical loads for an average LAN was probably 10 megabits.

Q. So the ProShare system was designed to operate at three preset data rates, one for ISDN, and the other two for LAN operations; is that right?

A. Again, I don't remember that detail sitting here today, but I don't have any reason to dispute what the paper says.

Q. Assuming there were three preset data rates, is it fair to say that one data rate is a low data rate, another data rate was a medium data rate and a third data rate was a high data

rate?

A. I really don't recall anything about the data rates that ProShare generated.

Q. Well, I'm not asking -- let me ask you not specific to the ProShare system. If you got a system that operated at three preset data rates, one for ISDN and the other two for LAN operation, would you agree that one data rate is a low data rate, another data rate is a medium data rate, and a third data rate is a high data rate?

ATTORNEY WILSON: Objection to form.

THE WITNESS: I don't think that necessarily follows. I mean, ProShare did whatever it did, and I don't recall if it was low, medium, high or was a change in the way it was doing coding at a constant bit rate. I mean, I really don't recall what these data rates were.

BY ATTORNEY SHENG:

Q. Separate and apart from the ProShare system, what would you consider a low data rate?

A. That would be a function of what point in time and history and what sort of network you were trying to use.

Q. In 1997, what would you consider a low data rate?

A. I don't recall for video what was considered a low data rate in 1997.

Q. So at the time in 1997, you have no opinion today what would be considered a low data rate in 1997?

A. No, I would have to go off and research that. And I just don't recall that detail from 19 -- I don't recall the detail from nearly 30 years ago.

Q. Do you agree that it's hard to remember details from 30 years ago?

A. It depends on what the details are.

Q. I'm asking you a detail about the state of the art; right?

A. You're asking a question about a subjective concept. What would people have considered a low data rate or what would I have considered a low data rate. It's one thing to say, you know, what was ISDN or what was ProShare. Those facts are easy to remember.

Subjective things like what was low, medium, and high in 1997 is something that I would have to go off and research because I don't have

any -- I don't have any firm recollection sitting here today.

Q. What would a person of skill in the art have considered a low bit rate in 1997?

A. Again, it depends on the network they were trying to use and what their application was. But generally, I don't recall the bit rates that were coming out of low bit rate coders in 1997.

Q. What about in 2004? What would a person of skill in the art consider a low bit rate in 2004?

A. I can't give you a quantitative figure.

Q. Is that because it's a subjective concept?

A. Because it depends on the application.

Q. Well, you testified earlier that what is considered a low bit rate is a subjective concept. What would people have considered a low bit rate or what would I have considered a low bit rate?

So my question to you is in 2004, you agree that what is considered a low bit rate in 2004 is a

subjective concept?

A. It's subjective in the sense that it's going to depend on the network. It's going to depend on the application. It's going to depend on what you're trying to do. It's not a one-size-fits-all world. If you determine an application in the environment, then I think you can start to be able to assess an issue like that.

Q. What about in 2024? What would a person of skill in the art consider in 2024 to be a low bit rate?

A. Again, I think it depends on the application.

Q. Do you agree that what is considered a low bit rate between 1997, 2004, and 2024 changes over time?

A. If you keep the application constant, you know, the goal of what you're trying to do, then sure, it would increase over time.

Q. What about a high bit rate? What was considered a high bit rate in 1997? Same answers?

A. Well, no. That one I can actually answer, because for -- and I can answer just for the application that we were working on. Because

there's typically a limit to high; right. For an application like video conferencing, the issue is there's a maximum that a codec can generate.

So the -- in the early nineties up to about '97, the systems that we were working with, the codec can generate a maximum of I think it was 2 megabits per second. And given the two megabits LANs that were dominating at that time, 2 megabits per second was considered a very high bit rate.

Q. You would agree with me, though, that between 1997, 2004, and 2024, what a person with skill in the art would consider a high bit rate would change during those different time periods; correct?

A. Keeping the application constant, you know, the goal of what you're trying to do, yes. It would -- what would be considered high is a function of the networking technology.

Q. What do you mean when you say by "keeping the application constant"?

A. Just that you're transmitting data for some purpose. And that purpose has an impact on how you assess issues of whether it's low bit rate or high bit rate.

Q. So sitting here today, you would not

be able to describe for me what a person of skill in the art with respect to the ABR patents would consider a low bit rate, medium bit rate, or high bit rate; correct?

A. For video streaming over the internet today, so for that particular application, we were trying to watch, for example, HD content. I think you can ballpark what a person of skill today would understand as low or high.

Q. What about in 2004? How would the low bit rate and high bit rate change compared to 2004?

ATTORNEY WILSON: Objection. Form.

THE WITNESS: Well, from what would be considered high or low today, it would obviously be less, but how much less is not something that I've researched.

BY ATTORNEY SHENG:

Q. You have no opinion; correct?

A. I haven't offered any opinions in my declaration on that topic, as best I recall.

Q. Going back to the paragraph we were looking at in Jaffay Exhibit 5 on page 3, top right

column, you state that your team took advantage of an internal interface to the video codec to implement on-the-fly adjustments to the video bit rate and frame rate.

Do you see that?

A. I do.

Q. What does that mean, "on-the-fly adjustments to the video bit rate and frame rate"?

A. I don't know. I don't recall. My recollection, as I testified earlier, was that we couldn't change the codec. So sitting here today, I don't recall what is being referenced here as on-the-fly adjustments.

Q. In paragraph 13 of your declaration you stated that you collaborated with researchers to modify the ProShare video conferencing system, but you're not able to tell me today what you mean in this article by "implementing on-the-fly adjustments to the video bit rate and frame rate"?

ATTORNEY PAQUETTE: Objection. Form.

THE WITNESS: Unless that's described in this paper, I don't recall specifically what is being referenced here.

BY ATTORNEY SHENG:

Q. Does on-the-fly adjustments to the video bit rate mean that you adjusted the -- adapted the bit rate of the media?

A. I don't -- as I say, I don't recall. My recollection was that we couldn't change the codec. So what I'm not recalling is this talking about changing the rate that's coming into the codec or changing the rate -- or changing the rate of data after it's emitted by the codec. I just don't recall the details of the implementation of the system.

Q. So sitting here today, you can't tell me the steps you took to take advantage of the internal interface of the ProShare codec to implement on-the-fly adjustments to the video bit rate or stream rate?

A. Correct. I don't recall specifically what was done here, unless, as I say, unless it's described in the paper.

Q. Sitting here today, are you able to tell me how long that process took you?

ATTORNEY WILSON: Objection. Form.

THE WITNESS: I can tell you that

the -- this project lasted about two years, to my recollection. But I'm not going to be able to tell you with more granularity how long did it take to do one particular step versus another.

BY ATTORNEY SHENG:

Q. Do you recall how you came to know that you could take advantage of the interface of the ProShare codec?

A. Well, everything we learned about the codec, we learned through our collaborators at Intel. So I don't specifically remember how we knew this, but my guess is that we learned this through our contacts at Intel.

Q. Were these changes to the internal interface of the ProShare codec software changes?

A. I don't think we ever said there was any changes to the internal interface of the codec. There were no -- as far as I know, there were no changes to any internal interface to the codec.

Q. So sitting here today, what do you remember -- what do you mean by you could take advantage of the internal interface of the ProShare codec?

A. You can take advantage of the

interface, which is not to say you're changing the interface. My recollection is that we either changed the video that we put into the -- my recollection was the codec itself you couldn't change. It was a hardware codec. It did what it did.

With that said, you can change what you put into the codec. And you can change -- you can manipulate what came out of the codec. But the codec was always -- my recollection today was the codec was always generating the bit stream that the codec generated.

Q. Just so I understand, you did not need to make any hardware or software changes to modify Intel's ProShare system to implement the on-the-fly adjustments to video bit rate and frame rate; right?

A. No, I mean, the system that we started with made no adjustments. So all of our modifications to the system were to implement what's described here, and I just don't recall the details of how what's described here was implemented.

Q. I guess what I'm getting at, Doctor, is did you have to make hardware changes or

software changes in the sense that you had to rewrite code in order to change the ProShare system?

A. Yes, we absolutely changed the software. The hardware we couldn't change. ProShare was basically a hardware product, and we did not change the hardware, which is why, as I say, my recollection is that you could not change the codec.

Q. Okay. So to modify Intel's ProShare system to implement on-the-fly adjustments to video bit rate and frame rate, you did not need to make changes to the hardware; correct?

A. That's a misleading statement. It's not that we didn't need to. You could not. The restraint of the prior project was you had to leave the hardware alone. So the only thing we could do was change the software. It wasn't that we didn't need to.

If we could have changed the hardware, this would have been a lot easier, but we couldn't change it. So all we did was in software, but it wasn't because we didn't need to change the hardware. It was because we could not change the hardware.

Q. Could you please turn to page 2 of Jaffay Exhibit 5 and look at the second paragraph under Section 2 titled "Background."

A. Sure (Witness complies with request.)

Yes.

Q. Background is related work?

A. Yes, I see that.

Q. The paragraph I want you to focus on begins with "video conferencing is an application," do you see that paragraph?

A. I do.

Q. I'm going to read that. Well, give me one second. I'm going to read the second sentence of that paragraph into the record.

"The goal of video conferencing is to prevent elements of multimedia streams in a regular periodic fashion with minimal latency to human participants."

Do you see that?

A. I do.

Q. Do you agree with that sentence?

A. Let me read this paragraph.

Yeah. For the way in which video conferencing was being practiced at that time, that

was true.

Q. Do you agree that video conferencing involved the presentation of elements of multimedia streams; correct?

A. Multimedia here just referred to audio and video. And the goal of -- given the constraints that we were operating under in the mid-1990s, that was the case, that the goal was to present elements of audio and video in regular fashion, regular periodic fashion with minimal latency.

Q. So in 1997 when you wrote this article, you agree that video conferencing involves the presentation of elements of multimedia streams; correct?

A. Elements of audio and video streams. There's -- multimedia there meant nothing than audio and video, and elements really meant frames. Frames of audio and video in a regular periodic fashion with minimal latency.

Q. Please turn to the next paragraph that begins with "Two primary methods."

Do you see that paragraph?

A. Okay.

Q. Can you please read from the first

half of that paragraph. Can you please read.

A. Yeah.

Q. Give me a second. Let me tell you exactly what I want you to read here. Go ahead, yeah, just read that paragraph, but I'm not going to ask you anything about the non-highlighted portions at the column to the right. But you're, of course, free to read those if you'd like. I'm going to ask you questions about the highlighted portion.

A. Sure. That's fine. Let me just read it.

So I get that you don't want to talk about reservation schemes.

Q. I don't think so.

A. Okay. You can ask.

Q. When you wrote this article in 1997, there were at least two primary methods of dealing with congestion for real time multimedia applications. Agree?

A. Yes. In 1997, this was our simple view of how to carve up the world.

Q. One method was resource reservation, and the other was adaptive media scaling; correct?

A. Correct.

Q. I'm going to read the third sentence of that paragraph into the record.

"Adaptive schemes monitor end-to-end performance and attempt to deal with congestion through adjustments through the attributes of the media stream."

Do you see that?

A. I do.

Q. So in 1997, it was known that adaptive schemes could monitor end-to-end performance and attempt to deal with congestion through adjustments to the attributes of media streams; correct?

A. Yes.

Q. And adjustments to the attributes of media streams included adjustments to bit rate -- the bit rate; correct?

A. I think -- let me look at what these references are here.

I guess the best answer to your question, I'd want to go and consult the disclosures in one of the references.

Q. Sitting here right now, you can't tell me whether or not that adjustments to the attributes and media streams in 1997 included

adjustments to bit rate?

ATTORNEY WILSON: Objection to form.

THE WITNESS: Well, bit rate has a particular understanding today that, as I've already testified, bit rate didn't -- had a different meaning in -- at the time a lot of this media scaling work was being done. And so that's why I say I'd want to consult one of the references to see how that reference described its media adaptation.

BY ATTORNEY SHENG:

Q. Okay. Let's go to the page 3 of that document.

A. Okay.

Q. The first full paragraph of page 3 begins with "To date, most adaptation schemes."

Do you see that?

A. Yes.

Q. So read the first two sentences in the record. It says, "To date, most adaptation schemes have been one-dimensional. That is, in times of congestion, they primarily adjust the bit rate and media streams. Two-dimensional scaling is

a more sophisticated scheme that independently adjusts the bit rates and the packet rates and media streams."

Do you see that?

A. Yes.

Q. In the sentence that I just read, does adjusting -- independently adjusting the bit rate means that the bit rate of the media stream was adjusted?

A. What it means is that you adjust what you transmit. It did not mean that you adjusted the bit rate of the codec.

Again, for what's being described here in particular as it relates to video, the video was always being coded the same way. You were changing the rate at which you were transmitting -- that you were changing the rate of data transmission. You weren't changing the bit rate of the video. You were changing the rate of video transmission by throwing data away.

Q. What does adjusting the packet rate of media streams mean?

A. Well, I think we've covered that. And that refers to how you partition the stream of data that you're going to transmit, how you

partition that stream into packets.

Q. In the third-to-last sentence of that section that we're looking at, it says, "Access constraints are alleviated only."

Do you see that?

A. Yes.

Q. "Access constraints are alleviated only through a reduction in the packet rate of the stream. In the latter case, this could be done by changing the packaging of the stream by simple techniques such as inter- or intrastream aggregation of media units. In particular, one can often change the packaging of the stream with no reduction in throughput bit rates."

Did I read that correctly?

A. I think you did.

Q. In 1997, it was known that the packet rate of a stream could be changed by changing the packaging of a stream by a simple technique.

Agree?

A. It was known -- you asked that awfully fast. Just ask it again.

Q. In 1997, it was known that the packet rate of a stream can be changed by changing

the packaging of a stream by simple techniques. Agree?

A. Yes.

Q. And the simple techniques included inter- or intrastream aggregation of media units. Agree?

A. Yes.

Q. What is inter- or intrastream aggregation of media units?

A. So the interstream is what I was referring to earlier, which is just saying that you decided on the data that you -- so there's a pipeline here. Media comes out of the codec. You do your data decimation. You decide what you're going to throw away, and then the stream, the transmit stream then has to be put into packets, and you can decide how much of the transmission stream goes in each packet. That's interstream aggregation.

Intrastream -- so at this time, codecs were not integrated. So audio -- the audio pipeline was completely separate from the video pipeline. They came from completely different devices.

And so what you could do was you could -- so the traditional way was you sent a sequence of

video packets, and separately you sent a sequence of audio packets, and then you had to synchronize them at the receiver.

What this is saying, which sounds kind of silly, because this is what's done all the time today, but it was a pseudo-novel idea then, was that you could also combine audio and video data in the same packet and transmit audio and video data together.

Q. Okay. Still on page 3. If you could look at the last full paragraph in the left column, above the section titled "System Description."

A. Sure.

Q. The paragraph begins with -- well, I'll just read it. It begins with, "Some adaptive schemes such as temporal video scaling, i.e., changing the video frame rate, adjust both packet and rate and bit rate."

Do you see that?

A. I do.

Q. In 1997, adaptive schemes were known, including temporal video scaling; correct?

A. Yes, we published a paper on this particular type of video scaling that didn't scale

the bit rate of the video, but just threw data away by essentially not transmitting video frames.

Q. Temporal video scaling is another way of saying you can change the video frame rate. Fair?

A. Changing the frame rate of what you transmit, not what you generate.

Q. Changing the frame rate adjusts both packet rate and bit rate; correct?

A. In the manner in which it was done here, yes. It changes the rate at which packets come, are received -- the way in which packets are transmitted and the rate at which bits are transmitted.

Q. Let's say the streaming system is transmitting the video that's 30 frames per second. Would changing the frame rate in the context of your article result in half the frames being sent, so I guess 15 frames per second, is that what you're talking about?

A. You can do that, but note, again, that the video still is being coded at the full 30 frames per second. So by discarding these frames, you're going to get a pretty diminished play-out experience.

Q. What do you mean by "diminished play-out experience"?

A. That if you're going to -- the way this would be done today is that if you're going to code at a lower frame rate than the full frame rate, you would -- sorry, if you want to generate a lower frame rate, you would code for that so that you could try and ameliorate the effects of reduced motion in the frame rate.

We didn't do any of that here. All we literally did was threw data away coming out of the codec. So this resulted in sharp transitions between frames.

Q. I see. So reducing the frame rate of the video from 30 frames per second to 15 frames per second would result in the video -- what the user sees would result in the user -- let me strike that.

Reducing the frame rate of the video from 30 frames per second to 15 frames per second would result in the user seeing the video with reduced motion; correct?

A. For the way in which it was -- for the specific way in which it's being done here, that is correct. We now have the capability today

to deal with those effects, so that you can get lower frame rates with still reasonable motion. So this is really an artifact of 1997 video.

Q. But using technology today, if you reduce the frame rate of the video from 30 frames per second to 15 frames per second, the user would still see the resulting video as having reduced motion; correct?

ATTORNEY WILSON: Objection to form.

THE WITNESS: There will be -- depending on -- so all this depends on what the contents of the scene are. But as a general matter, they would will perceive -- probably perceive less motion than in -- at the full frame rate. However, the experience they're going to have today is going to be way better than the experience they had in 1997.

BY ATTORNEY SHENG:

Q. The experience today would still be reduced motion; correct?

A. It would be reduced motion, but it will undoubtedly be far more tolerable.

Q. Assume I have a video at 30 frames

per second, and I reduce the frame rate to one frame per second. How would that change what the user sees?

ATTORNEY WILSON: Objection. Incomplete hypothetical.

THE WITNESS: Yeah, I don't understand your hypothetical.

BY ATTORNEY SHENG:

Q. So if I encode a video to be one frame per second instead of 30 frames per second, what will be the difference between a 30-frame per second video versus a one-frame per second video?

ATTORNEY WILSON: Objection. Form.

THE WITNESS: In terms of the user experience?

BY ATTORNEY SHENG:

Q. Sure.

A. Okay. Well, it's going to depend on the content. If you're showing, you know -- if the video is of a PowerPoint slide, you know, it may not make much of a difference. If the video is of a car race, it's not going to be a good experience.

Q. Okay. So let's use the car race experience. So let's say a user is watching a car

race at 30 frames per second and then suddenly for whatever reason the frame rate drops to one frame per second. Describe the user experience at that point.

A. I don't think I can describe it in any quantitative sense. I mean, it's going to be a bad experience.

Q. So a 30 frame-per second video, each frame would be displayed for one-thirtieth of a second. Is that fair?

A. 33 milliseconds.

Q. The answer is yes?

A. Yes.

Q. And a video at one frame per second would essentially be one frame per second; correct?

A. One frame would be displayed for one -- each frame would be displayed for one second. That would probably be the most obvious way to implement that.

Q. Have you ever heard of anyone refer to a video encoded at an extremely low frame per second as a video with no motion?

A. I don't -- I don't know.

Q. You've never heard that?

A. I mean, it's such a general phrase.

I've heard of -- you know, I'm familiar with people describing and trying to quantify motion when they're trying to assess the effect of a motion compensator in a codec. People will speak of video as having a lot of motion or limited motion and things like that.

Q. Can we agree that it would be fair to refer to a video encoded at extremely low frames per second as a video with no motion?

ATTORNEY WILSON: Objection to form.

Q. Fair statement?

A. Well, hang on. It's going to depend on what's the content, and it's going to depend on the codec. But I'm sure you can find content and a codec for which you could say that there was no motion at a very low frame rate.

Q. Going back to my example where a user is watching a -- I think we were saying car race. Was that what we were talking about?

A. Yeah.

Q. Okay. Going back to my example of the car race, a user watching a car race at 30 frames per second and the frame rate drops to one frame per second, would you agree that the user is

still watching the same car race?

ATTORNEY WILSON: Objection. Form.

THE WITNESS: Well, they're certainly watching the same race. They are essentially seeing like a slide show of the race.

ATTORNEY WILSON: I think we've been going for quite a while.

ATTORNEY SHENG: I've got about five more questions. Can we get -- is that okay, Doctor?

THE WITNESS: Sure.

BY ATTORNEY SHENG:

Q. Go to page 4 of Exhibit, I believe, 5 or whatever the document that we've been looking at.

A. Okay.

Q. The last paragraph in the column to the left beginning with "All adaptive schemes." Sorry, page 4.

A. I'm with you.

Q. All adaptive schemes. I'll read it into the record. "All adaptive schemes use feedback from the receiver to detect congestion and

adjust the stream appropriately. The adaptation process in one-dimensional schemes is straightforward, as there is only one variable that is manipulated; i.e., bit rate."

Do you see that?

A. I do.

Q. And the receiver mentioned here is the client, can we agree?

A. Well, so this is not a client server system. As I say, it's a peer-to-peer system, two end points. And so each end point has a sender and a receiver. So each end point here has a receiver that's detecting congestion and feeding that information back to the sender.

Q. Understood. In 1997, it was known that adaptive schemes use feedback from the receiver to detect congestion and adjust the streams appropriately; correct?

A. To understand the statement fully, what I would say is in 1997, it was known that all adaptive schemes use feedback at the receiver to detect congestion that is sent to the sender for the sender to adjust the streams appropriately. That was true of just about all adaptive schemes that I was aware of at that time.

Q. In 1997, one-dimensional adaptation processes such as manipulating bit rate was straightforward. Agree?

A. It's straightforward in the context that follows, which again describes simply throwing away video frames.

Q. Last few questions here. Can you turn to page 12 of that exhibit.

A. Sure. (Witness complies with request.)

Q. And in page 12 there's a section titled "Summary and Conclusions."

Do you see that?

A. Now I'm with you.

Q. The second sentence of that section states, "These experiments showed that an adaptive system using inexpensive components can, with a significant rate of success, provide usable video conferences between widely separated points on the internet."

Do you see that?

A. I do.

Q. In 1997, you modified the ProShare disclosure system to provide bit rate and packet rate media scaling using inexpensive components;

correct?

A. I'm kind of smiling when I see "inexpensive," because I thought ProShare was actually kind of expensive. That's what they said.

I think maybe what this means is that, you know, you don't have to buy any new hardware, that there are ways you can deal with a hardware codec without changing the codec. Yeah.

Just means -- I read this to mean that saying just adding software you can -- you can add software to the system.

Q. In 1997, you showed that an adaptive system using these inexpensive components can provide usable video conferences between widely separated points on the internet; correct?

A. Yes. For the ProShare system with the adaptation at the sender, that's what we showed.

Q. And in 1997, you showed that an adaptive system using inexpensive components can provide usable video conferences between widely separated points on the internet with a significant rate of success; right?

A. Yes. I'll just put an asterisk here that it's important to understand that the measures

of success in 1997 by today's standards were incredibly low.

Q. With that in mind, in 1997, the expected rate of success was significant; correct?

A. Yes, for our definition of success and the way the ProShare system worked, we declared success.

Q. Very good. Good time for a break.

THE VIDEOGRAPHER: Going off the record. It's 11:56 a.m. Off the record.

(Discussion held off the record.)

(Recess taken from 11:56 a.m. to 12:19 p.m.)

THE VIDEOGRAPHER: Time is 12:19 p.m. We are now on the record.

BY ATTORNEY SHENG:

Q. Doctor, did you discuss your deposition with anybody at the break?

A. I did not.

ATTORNEY SHENG: Can you mark this as Jaffay Exhibit 6.

(Exhibit 6 was marked for identification.)

Q. Jaffay Exhibit 6 is a declaration

that I pulled online that appears to be something you submitted in an IPR brought by Facebook against a patent owner called Boxer, B-o-x-e-r.

ATTORNEY WILSON: Standing objection to this document as to the scope.

THE WITNESS: I think what you said seems correct.

BY ATTORNEY SHENG:

Q. You were retained by Facebook as an expert. Do you recall that?

A. I do.

Q. Facebook was a petitioner in this IPR; correct?

A. They were.

Q. Facebook retained you as an expert to argue for invalidity of the '557 patent; correct?

A. Yes.

Q. The '557 patent, do you recall, was it related to video streaming?

A. I think that was actually a bone of contention in the case. It was certainly being read on a video streaming system. That I distinctly remember.

Q. Please turn to paragraph 40 of Jaffay Exhibit 6.

A. Okay. (Witness complies with request.)

Got it.

Q. Paragraph 40, you see that you say the earliest priority date for the '557 patent was June 2007.

Do you see that?

A. Yes, I see that.

Q. Can you turn to Paragraph 50.

A. (Witness complies with request.)

Q. Okay. Read paragraph 50 to yourself. Let me know when you're done.

A. (Witness complies with request.)

Okay.

Q. The processes and principles of transmitting audio and video data in real time over best effort networks were well established long before the '557 patent. Agree?

A. For things like video conferencing, yes.

Q. What about not limited to video conferencing?

ATTORNEY WILSON: Objection.

Form.

THE WITNESS: As -- as of 2007 -- I understand there were lots of approaches that were -- yeah, I think by 2007, I think there was known there was a variety of approaches that you could use to transmit audio and video in real time over best effort networks.

Real time, though, is really what the key was. And real time to me was for things like voice-over-IP or video conferencing.

BY ATTORNEY SHENG:

Q. So I think we have an error in the transcription. Let me read you the question again so we can fix that.

A. Sure.

Q. Well, let me start earlier than that. The processes and principles of transmitting audio and video data in real time over best effort networks were well established long before the '557 patent. Agree?

A. Yes.

Q. Indeed, just as one example, your research group at UNC is publishing on the topic of

transmitting audio and video data in real time over best effort networks nearly 15 years before the priority date for the '557 patent; right?

A. That's correct.

Q. And your research group at UNC was demonstrating systems for adapting real time transmission of audio and video data nearly 15 years before the priority date of the '557 patent; right?

A. We have demonstrated the system more than 15 years before 2007, that's correct.

Q. Fifteen years before the priority date of the '557 patent was around 1992; correct?

A. Correct.

Q. By 1992, you had constructed a video messaging system that detected whether or not data was being received in real time by estimating the bandwidth available along the delivery path to recipient; right?

A. Correct.

Q. And in this video messaging system, when the current data rate being transmitted was not sustainable, the system determined an amount by which to reduce the video bit rate and adaptively modify the current video generation and codec

parameters to reduce the video bit rate; right?

A. Correct.

Q. You conclude paragraph 50 by stating that your research group was only one of several to work on these problems.

Do you see that?

A. I do.

Q. In 1992, other research groups were investigating systems for adaptive real time transmission of audio and video data; correct?

A. I think that is correct.

Q. You can put that exhibit away.

Do you remember earlier you discussed how you were impressed by Dish's ABR patents when we reviewed the '444 patent in the 2016-2017 timeframe?

A. Yes.

Q. Do you recall that discussion generally?

A. Yes.

Q. One of the reasons you were so impressed by Dish's ABR patents is that they disclosed encoding a video stream at various bit rates and selecting an appropriate stream for delivery to the end user based on current bandwidth

availability on the network; right?

A. Yeah. I mean, the initial reason to be impressed was, as I say, its similarity to DASH, and that's certainly a big part of it.

Q. Okay. Let's stay on this exhibit for a minute. Can you turn to paragraph 42.

A. Okay. (Witness complies with request.)

Okay.

Q. About midway through paragraph 42, you have a sentence that begins, "Video is a sequence of video images."

Do you see that?

A. Yes.

Q. Video is a sequence of video images. Agree?

A. Yes.

Q. Video is a sequence of video images where each image is acquired and displayed for a certain duration, and then the next image in the sequence is acquired and displayed. Agree?

A. Yes.

Q. The time between one video image is acquired and displayed, and when the next video image is acquired and displayed is typically fixed;

right?

A. Yes.

Q. You would agree that video has a temporal dimension that could be measured by the number of video images displayed per unit time; correct?

A. Yes, that's the way typically people understand the temporal aspect of video.

Q. That is commonly referred to as the video's frame rate?

A. That is correct.

Q. In paragraph 41, you don't mention anything about audio, do you?

A. 41?

Q. I'm sorry. 42.

A. Oh.

Q. Let me just reask the question.

In paragraph 42, you don't mention anything about audio; correct?

A. That is correct.

Q. In paragraph 42 of the declaration you submitted in the Facebook IPR, you don't mention anything about video requiring an audio component. Agree?

A. In paragraph 42? That is correct.

Q. Can you turn to paragraph 47.

A. (Witness complies with request.)

Okay.

Q. The first sentence of paragraph 47 -- hold on one second, sorry.

Sorry. Let's go now to Exhibit 2006, which is the -- your expert declaration in support of Dish's POR of the '138 patent. I want to go to paragraph 47 of Exhibit 206.

A. Okay.

Q. In the first sentence of paragraph 47, you state, "In addition, while HTTP is today the dominant transport means for streaming media, I was impressed by the use of HTTP in the ABR patents."

Do you see that?

A. I do.

Q. In the 2016 to 2017 time frame, you were impressed by the use of HTTP in the ABR patents; correct?

A. Yes.

Q. In the next sentence you state, "As discussed above, I have worked on a variety of streaming media projects during the 1990s and recall that during this time, I was skeptical an

effective streaming system could be developed using HTTP."

Do you see that?

A. I do.

Q. And you list several reasons why you were skeptical, including its overhead and its reliance on TCP.

Do you see that?

A. I do.

Q. Are you aware of any other streaming systems that predate Dish's ABR patents that use HTTP as a delivery mechanism?

A. Sure. I think there were several that used HTTP, but as I recall, none of them -- none of them worked as well as streaming systems today that use HTTP do.

Q. Let's go back to Jaffay Exhibit 6, which is your declaration in the Facebook IPR. Let's go to paragraph 60.

A. Sorry. I was reading something else. Sixty.

Q. Six-zero, yes.

A. Okay.

Q. I'll read the first sentence into the record. "Even HTTP has been used as a real

time streaming" --

A. I'm sorry. I'm on paragraph 61, sorry.

Q. 60.

A. My fault. Okay.

Q. This is the Facebook --

A. Yes, paragraph or page?

Q. Paragraph 60.

A. Okay. Got it, thank you.

Q. The first sentence of paragraph 60 states -- first sentence of Paragraph 60 states, "Even HTTP has been used as a real time streaming protocol."

Do you see that?

A. I do.

Q. And in the next sentence you identify the Carmel patent, which was filed in March 1999, as an example of HTTP being used as a real time streaming protocol; correct?

A. Yes.

Q. Looking at paragraph 60 still, you agree that Carmel disclosed that the clients download the data stream from the server, preferably using an internet protocol, as well most preferably the hypertech transfer protocol, HTTP.

A. I believe that is what Carmel says.
Q. Can you turn to paragraph 20.
A. (Witness complies with request.)
Q. In paragraph 20, you list number of documents --
A. Hold on, hold on.
Q. Sure.
A. I was going to say where does it start. Got it.
Q. In paragraph 20, you list a number of documents you reviewed in connection with the analysis you performed in the Facebook IPR; right?
A. That appears to be the case.
Q. Can you look at item number -- letter S as in Sam.
A. Yes, I see that.
Q. The Carmel reference is U.S. Patent Number 6,389,473; correct?
A. Yes.
Q. You testified about this same Carmel reference in the ITC investigation. Do you recall?
A. I do.
Q. Your testimony concerning the Carmel reference in the ITC investigation was truthful and accurate as far as you know; correct?

A. Yes.

Q. So if I asked you the same question that you were asked at the ITC hearing, your answer would not materially change. Is that fair?

A. They shouldn't. I mean, to the extent that the context is the same, they shouldn't change.

Q. Let's go to the next paragraph, 61.

A. Sixty-one?

Q. Yes.

A. Okay.

Q. Let me know when you're there.

A. Okay.

Q. Do you agree that by 2007 HTTP was in widespread use as a real time streaming protocol; agree?

A. Yes.

Q. And I'm looking at the second-to-last sentence now of paragraph 61. You agree that HTTP was particularly well suited for video streaming since by the early 2000s, network security was a widespread concern and firewalls were widely deployed to limit the types of network traffic entering a network; correct?

A. Yes.

Q. By the early 2000s here, would you agree you that mean between 2000 and 2004?

A. I don't recall what time frame I'm describing here. I would probably say it's probably, you know, the aughts, as people say.

Q. What does that mean?

A. 2000 to 2010.

Q. Early 2000s would include 2010?

A. Well, it's up to 2010. I mean, I don't think this is a super definite, precise statement. If I said early 2000s, that's probably what I meant.

Q. It was known by the early 2000s that HTTP was particularly well suited for video streaming; correct?

A. For this aspect of HTTP, yes.

Q. That was because network security was a widespread concern and firewalls were widely deployed to limit the types of network traffic entering a network; correct?

A. Yes.

Q. Given the dominance of the web, HTTP traffic was almost universally allowed to transmit firewalls, hence streaming video over HTTP greatly simplified the problems of video distribution;

correct?

A. Correct.

Q. That was known in the early 2000s; correct?

A. Correct.

Q. Can you turn to paragraph 102.

A. (Witness complies with request.) Okay.

Q. Do you see paragraph 102 is under a section titled "Overview of the prior art references"?

A. I see that.

Q. In paragraph 102, you identified the Brueck patent; correct?

A. Correct.

Q. The Brueck patent at issue is the '444 patent; right?

A. I think that's the patent that's in here.

Q. The '444 patent was one of the references you were using as prior art against the '557 patent in the Facebook IPR; right?

ATTORNEY WILSON: Objection. Foundation.

THE WITNESS: Yes, the '444

patent.

BY ATTORNEY SHENG:

Q. You would agree with me that Dish's '444 patent is in the same field of art as the '557 patent you were trying to invalidate; right?

A. I don't actually remember the '557 patent with much detail. I assume it was, but I don't really recall.

Q. You can set aside Jaffay Exhibit 6.

Let's go back to Exhibit 2006, which is your declaration in support of Dish's IPR for the '138 patent.

A. Okay.

Q. Look at paragraph 53. You can read paragraph 53 to yourself and let me know when you're done.

A. (Witness complies with request.)

Okay, I've read it.

Q. You're making an argument here in paragraph 53 that Ogden does not disclose video streaming because Ogden's video was a media treated and managed separately from any corresponding audio. Agree?

A. No. I think what I'm saying here is that Ogden doesn't disclose video streaming. And

then -- that's the take-on message from paragraph 53. And part of what's used to support that are several things, and one of them is that audio and video were managed separately in a particular way in Ogden.

Q. I thought that's what I asked you. So I'm going to go ahead and ask you it again.

In paragraph 53, you're making an argument that Ogden does not disclose video streaming because Ogden -- because Ogden does not disclose video streaming -- let me strike that.

In paragraph 53, you're making an argument that Ogden does not disclose video streaming because Ogden's "Video was immediately treated and managed separately from any corresponding audio." Correct?

A. That's part of the argument.

Q. Okay. That's at least part of the argument?

A. Yes.

Q. Can we agree?

Another part of your argument or perhaps it's the same argument is video in "Ogden was pure video and did not include audio." Correct?

A. Well, that's just -- that's a true

statement, and that's in support of the previous statement about how video was treated separately from audio.

Q. Okay. So you seem to be fighting me on paragraph 53, and I'm just trying to understand what your argument is. So why don't you tell me, Doctor, what is your argument in paragraph 53.

A. I think it's pretty straightforward is that Ogden doesn't teach or suggest video streaming, as claimed in Claim 1 in the claims of the '138 patent and that it teaches away from it.

Q. Okay. And your argument is that Ogden does not disclose video streaming because Ogden's video was immediately treated and managed separately from any corresponding audio; correct?

A. That's part of it. The starting point is that Ogden is teaching away from it because Ogden is saying that video is going to require specialized video conferencing equipment that comes at substantial expense. So Ogden doesn't want to be streaming video because of the expense factor. So that's the first part.

And then the second part is that Ogden is really focused on the delivery of audio, and audio is separate from video.

Q. You distinguish Ogden from the ABR patents because video in the context of the ABR patents is understood to be a single integrated stream of moving images in the corresponding audio. Is that correct?

A. Correct.

Q. Is it your opinion that video as used in the ABR patents requires an integrated stream of moving images and corresponding audio?

A. I don't know if it requires it, but I think that's the common understand -- that's what Ogden -- it's Ogden. That's what the ABR patents are teaching in terms of all their disclosures of the video. Whether or not the claims require it is -- I don't think I've opined on that topic.

Q. You have no opinion, sitting here today, whether or not the claims of the ABR patent require an integrated stream of video and audio; correct?

A. Well, we'd have to look at some specific claims, and the claims are different across the patents. But as I recall, I don't think the claims recite a specific requirement for that.

Q. You have no opinion?

A. No, I said if you want opinion about

a claim, let's pick a claim and we can talk about that.

Q. You state in paragraph 56 -- let's turn to paragraph 56.

A. Okay, I'm there.

Q. You state that in the first sentence, "By contrast, The '138 patent and the ABR patent is directed to a more contemporaneous conception of video and is directed to video streaming; i.e., distributing a continuous live video feed for a large pre-recorded video conference for consumption over a network where video in this context is understood to be a single integrated stream of moving images in the corresponding audio."

Do you see that?

A. I do.

Q. So if I understand you correctly a minute ago, you have no opinion, though, whether or not the ABR patents require video to be a single integrated stream of moving images and the corresponding audio; correct?

A. You're asking about the claims, and I said, you know, I can't characterize all of the claims at once. So if you want to talk about a

specific claim and what it requires, I'm happy to do that.

Q. Can you agree that if the claim did not reinvite that video requires a single integrated stream of moving images in the corresponding audio, that that's not required?

A. I think we'd have to look at the individual claims. I mean, what this statement here in paragraph 56 is talking about is what the patents themselves are directed to.

ATTORNEY SHENG: Can you mark this as Jaffay Exhibit 7. Actually, yeah, let's go ahead and mark it.

(Exhibit 7 was marked for identification.)

Q. Jaffay Exhibit 7 has been previously marked as Exhibit 1001, but just because all the patents, we have multiple patents that are designated 1001, I've marked it as Jaffay Exhibit 7. Jaffay Exhibit 7 is the '138 patent. Agree?

A. No, I don't think that's right.

Q. Okay. Apologies. Let's mark this as Jaffay Exhibit 8.

(Exhibit 8 was marked for

identification.)

Q. Jaffay Exhibit 8 is the '138 patent. Agree?

A. Yes.

Q. If we turn to Column 3, lines 55 to 60.

A. (Witness complies with request.)

Q. Can you read Column 8, lines 55 to 60, and let me know when you're done.

A. (Witness complies with request.)

Okay, I read it.

Q. Do you agree that in the context of the ABR patents, the content file can be an encoded streamlet?

A. I agree that each streamlet could be encoded as a separate file.

Q. As a separate content file?

A. As a separate content file.

Q. Could you turn to Column 7, lines 17 to 19. I'm looking at the sentence saying "The content file 200 may comprise."

A. I see that.

Q. I'll read it into the record. "The content file 200 may comprise uncompressed video and audio or alternatively, video or audio."

Do you see that?

A. I do.

Q. Do you agree that the ABR patents distinguish between video and audio?

A. They certainly distinguish them as between different media types, yes.

Q. The ABR patents disclose that a content file may comprise both video and audio or alternatively just video or just audio; correct?

A. For the embodiment that they're discussing here, that's the case.

Q. I'm handing you what's been previously marked as Exhibit 1004. Exhibit 1004 is the Ogden reference. Agree?

A. That's what it appears to be.

Q. Can you turn to Column 2, lines 1 to 6.

A. (Witness complies with request.) Okay.

Q. Column 2, lines 1 to 6, state, "For example, the present invention may communicate the video portion of a presentation to a user site via the internet. More generally, via any TCP/IP network while the corresponding audio portion may be communicated to the user site via a conventional

telephony network and a conventional telephone at the user site."

Do you see that disclosure in Ogden?

A. I do.

Q. Is this what you rely on for your opinion that Ogden discloses treating the video separately from corresponding audio?

A. I'm relying on all of Ogden, and this is certainly one passage that supports my opinion.

Q. You would agree that open-ended language like "for example" and "may" to introduce concepts mean that the examples provided are not limiting?

A. Generally, yes.

Q. Column 2, lines 1 to 6 begins with the words "for example"; right?

A. Yes.

Q. And the very first sentence uses the word "may"; right?

A. Yes.

Q. And may, the use of the word "may" is not citing a hard and fast requirement; correct?

A. Generally, that's correct.

Q. So communicating the video portion

of a presentation to a user via the internet and the audio portion to the user via a conventional telephony network are nonlimiting examples. Agree?

A. It's an example, but this is -- this is really the focus of Ogden.

Q. Let's read the next two sentences, Column 2, lines 7 to 12. I'll read it into the record. "However, other embodiments are also within the scope of the present invention. For example, both the video and audio portions of the presentation may be provided solely by a TCP/IP network such as the internet, assuming that there is sufficient communication bandwidth to synchronize presentation transmissions to the presentation members."

Did I read that right?

A. I think you did.

Q. Ogden discloses that both the video and audio portions of the presentation can be communicated to the users together solely by a TCP/IP network; correct?

A. It certainly says that. It doesn't really provide any examples of that.

Q. Do you agree that Ogden says that both the video and audio portions of the

presentation can be communicated to the user together solely by a TCP/IP network? Agree?

A. It says that, and a person with ordinary skill in the art in 1997 would understand that this is no small feat.

Q. Ogden discloses that the video and audio portions of the communication could be communicated to the user together solely by a TCP/IP network, assuming there is sufficient communication bandwidth to synchronize the video and audio transmission to the users; correct?

A. You're paraphrasing, but that's generally what it says.

Q. Can we agree that Ogden discloses synchronizing the audio with the video?

A. No.

Q. Can we agree that assuming that there is sufficient communication bandwidth, that Ogden teaches synchronizing presentation transmissions to the presentation members?

A. That's what it says.

Q. We can go back to your declaration, Exhibit 206.

That's the declaration in support of Dish's POR for the '138 patent.

A. Okay.

Q. Please turn to paragraph 74.

A. Okay.

Q. In paragraph 74 you provide a block quote, and underneath the block quote you state, "Here, Ogden discloses creating multiple presentation versions that each includes segments, subcollections of a content."

Do you see that sentence?

A. I see that sentence.

Q. Let's start there. You agree that Ogden discloses creating multiple versions of a presentation that each includes segments or subcollections of contents." Correct?

A. Well, let me read this.

(Pause)

A. Okay. Could you just ask your question again.

Q. Do you agree that Ogden discloses creating multiple versions of a presentation that each includes segments or subcollections of content; correct?

A. Yes.

Q. Do you agree that Ogden discloses creating multiple versions of the same

presentation?

A. Yes.

Q. In the next sentence of paragraph 74, you say that Ogden gives two examples of segments.

Do you see that?

A. I do.

Q. The first example is Ogden discloses a configuration where the segments of one version contain real time or animated video; correct?

A. That's what's written.

Q. So you agree that at least one of the presentation versions disclosed in Ogden is segments of video; correct?

A. Segments of what Ogden refers to as real time or animated video, not video more generally.

Q. But you agree that at least one of the presentations versions disclosed in Ogden is segments of real time or animated video; correct?

A. Yes, that's what Ogden discloses.

Q. And you say the segments of the second presentation version contain graphic slides; correct?

A. Yes.

Q. And your argument there is that slides are an alternative presentation format that would appear to include different content. Is that right?

A. Yes.

Q. Why did you use the word "appear" in that sentence? "Slides are an alternative presentation format that would appear to include different content." Are you not certain whether slides would include different content?

A. Ogden has no disclosures of the content of its slides. But I'm saying they appear to have different content because generally a slide -- information on a slide would be different content than information on a video.

Q. Can we agree that it's possible for slides to include the same content as the video?

A. I don't know. I don't think -- I can't necessarily agree. I think a slide as that's understood in Ogden is one form of content. Video is understood in Ogden as a different form of content. So in all likelihood, these are two media that would have -- that would be different forms of content.

Q. Graphic slides could be frames from

the same video; correct?

A. Graphic slides could be frames -- there's no disclosure of that. There's no suggestion of that, and, in fact, I can't see how that would work. So as a hypothetical, maybe. But I don't think any of that is in Ogden.

Q. So separate and apart from what's disclosed in Ogden, can we agree that a person of ordinary skill would understand that in 1997 graphic slides could be made up of frames from a video?

ATTORNEY WILSON: Objection. Form.

THE WITNESS: You could take a video, extract individual frames and put those frames on a slide. A person of skill in the art could do that.

BY ATTORNEY SHENG:

Q. So let's take a step back. Do you agree that Ogden discloses that at least one of the presentation versions can be real time video; correct?

A. Yes.

Q. Or animated video as well; correct?

A. Correct.

Q. Can we just say that Ogden discloses that at least one of the presentation versions can be video?

A. Can be -- not just any old video, but Ogden seems to have a particular conception of video; in particular, this motion of animated video. So it's saying it's not just any old video, but real time or animated video.

Q. Does Ogden disclose that both presentation versions can be the real time video?

ATTORNEY WILSON: Objection. Form.

THE WITNESS: Both presentations --

BY ATTORNEY SHENG:

Q. Let me take a step back. I'll strike that question.

So we agree that at least one of the presentation versions could be an animated video; correct?

A. Yes.

Q. And we discussed earlier your opinion that the second presentation version of Ogden is graphic slides. Do you follow that?

A. Yes.

Q. Does Ogden disclose an embodiment where both presentation versions are both video?

A. I don't recall such a disclosure.

Q. So is it your opinion that Ogden only discloses video for one presentation version and graphic slides for another presentation version?

A. Ogden discloses what it discloses. It's just sitting here today, I don't recall a disclosure where the alternative version to real time or animated video is also real time or animated video.

Q. In paragraph 74 where you discuss the two versions, presentation versions of Ogden, can we agree that you don't cite any portion of the Ogden specification to support that opinion?

A. There's no "cite" in this paragraph. I believe though, that I do have cites in here for these disclosures in Ogden.

Q. Let's go to Ogden. You should have a copy of that.

A. Yes.

Q. Go to Column 2, lines 61 to 66.

A. Okay.

Q. Do you see the words "graphic

slides" in line 66?

A. Let me just read this. I see that.

Q. I'll represent to you that this is the only place in Ogden that uses the phrase "graphic slides." Your attorney can check with me on a break or redirect. So I'll represent that to you today.

A. Okay.

Q. Is Column 2, lines 61 to 66, the portion of Ogden you are relying on to support paragraph 74 of your expert report?

A. Well, I'm relying on all of Ogden. But this is certainly -- this is certainly evidence in support of my opinion.

Q. Okay. So let's start a little bit earlier from Column 2. Let's look at lines 45 to 49.

A. Okay. 45 through 49, okay.

Q. Starting with the words "Moreover, substantially every segment." Let me when you're there.

A. I'm there.

Q. Column 2, lines 45 to 49, state, "Moreover, substantially every segment or subcollections thereof in one version corresponds

with the segment or subcollections thereof having the same presentation order in each of the other versions."

Do you see that?

A. I do.

Q. Do you agree that Ogden discloses an embodiment where every segment in one version corresponds with the segment that has the same presentation order in each of the other versions; agree?

A. I think he's saying that the majority of segments in the version have that correspondence.

Q. Do you agree that there could be multiple other versions of a presentation? Well, it says "in each of the other versions," plural. Can we agree that there could be multiple other versions?

A. There's certainly -- Ogden certainly uses plural here. I don't recall if -- I'm not recalling any disclosures in Ogden of there being -- other alternative versions, yes. I think there can be multiple alternative versions.

Q. If we were to assume that you are correct that Ogden's first presentation video --

first presentation version is video and a second version are graphic slides, how could substantially each segment of video correspond with a segment of graphic slides? Can you explain how that would work.

A. I'm sorry. I just -- I couldn't parse your question. Just say it again maybe a little slower.

Q. Sure. Let me ask -- let me ask it this way: You would agree that Ogden, the Ogden system, discloses a first presentation version of this video; correct?

A. It's not a first presentation version of this video. It's that a presentation version can be video.

Q. And the second presentation version is graphic slides; correct?

A. In the example we were looking at at the bottom of Column 2, yes.

Q. And the idea is that Ogden will switch between the video and the graphic slides; correct?

A. Correct.

Q. So I guess my question is a user -- tell me about the user experience using the Ogden

system. What would the user experience be like seeing the video switched to graphic slides?

ATTORNEY WILSON: Objection. Form.

THE WITNESS: Well, as I say in my report and having used systems that are substantially similar to Ogden, I mean, we had a system like this. The video in our system was often -- it was the video going to the monitor that the presenter was presenting slides at. So you're capturing the output going of VGA display. So it's video of whatever the presentation is. And Ogden is rife with disclosures that the video is the video of the presentation.

And so instead of seeing the video that the leader is seeing on their monitor, you would be seeing static slides. So you might not -- so if there was like a PowerPoint animation, you're not going to see the animations, you'll just see, you know, static slides.

BY ATTORNEY SHENG:

Q. So the user on the Ogden system

watching the video, let's say the bandwidth drops. Do you agree that the user or what the user sees would then switch to the graphic slide?

A. That is -- that is certainly a scenario that can happen. That's not contemplated in Ogden.

Q. And then if the network bandwidth increases, the user could switch back to the video; is that correct?

A. I don't recall any disclosure of that in Ogden.

Q. But your understanding of Ogden is that it could start with the video, switch down to the graphic slides, and the user is stuck with the graphic slides for the remainder of the presentation. Is that right?

A. I don't recall Ogden dealing with the situation where more bandwidth becomes available.

Q. So if the user is watching the graphic slides and network conditions improve, your understanding is that Ogden does not disclose switching back to the video version?

A. I'm just saying I don't recall a disclosure of that. If I'm wrong, perhaps you can

point me to a disclosure of that in Ogden.

Q. Let's go to the next couple sentences there in Column 2, lines 49 to 55. So lines 49 to 55 start with "Thus, assuming corresponding segments."

Do you see that?

A. Yes.

Q. I'll read it into the record. It says, "Thus, assuming corresponding sections or subcollections thereof, different versions have approximately the same presentation duration. Any of the corresponding alternative segments or subcollections thereof from different versions can be presented as a replacement for another such corresponding segment or subcollections during the presentation."

Do you see that?

A. I do.

Q. So do you agree that Ogden discloses that every segment in the different versions have approximately the same duration such that a segment from one version can be a replacement for a corresponding segment in a different version?

A. No. That's not what this says.

Q. Okay. Correct my statement then.

A. This says if you make the assumption that the corresponding segments in different versions have approximately the same presentation duration, and so because it's an assumption and not a statement of fact, I think a person of skill would understand that Ogden is saying that that may not be true.

So if you make that -- under that assumption that they have approximately the same duration, not the same duration, then under that assumption you can substitute corresponding segments for one another as replacements.

Q. Do you agree that assuming corresponding segments or subcollections thereof in different versions have approximately the same presentation duration that a system of Ogden or that Ogden discloses that every segment in a different version have -- strike that.

Do you agree that assuming corresponding segments or subcollections thereof in different versions have approximately the same presentation duration, each segment from one version can be a replacement for a corresponding segment in a different version?

A. Under that assumption, I think

that's what Ogden is saying.

Q. Okay. So let's go on to Column 2, lines 55 to 61.

A. Okay.

Q. It says, "Thus, it is an aspect of the present invention to provide corresponding alternative segments or subcollections thereof, having substantially different network transmission requirements so that such corresponding alternative segments or subcollections thereof can be substituted for one another, depending on the performance of the communications network."

Do you see that?

A. I do.

Q. Do you understand this disclosure to mean that the system can switch up or down, depending on the network transmission requirements and the performance of those communications networks?

ATTORNEY WILSON: Objection to form.

THE WITNESS: I just don't understand it based on what it says, and all of the -- as I say, I don't recall a disclosure in Ogden of being able to

switch to more bandwidth-intensive segments.

BY ATTORNEY SHENG:

Q. What does the phrase "different network transmission requirements" mean here?

A. Where are you?

Q. Column 2, lines 55 to 61.

A. Yeah, I know, but I'm trying to find the exact words which you're asking. I see. I see. I think what that would mean is substantially -- it would take substantially different amounts of time to transmit the segment.

Q. Do you agree that one version of the presentation will be displayed when the network bandwidth is at one rate, and a different version of the presentation will be displayed if the network bandwidth drops to a different rate? Is that fair?

A. Maybe. I mean, it's all going to depend on the requirements and the bandwidth.

Q. What was the last -- you said maybe it's all going to depend on what?

A. I think I said the --

Q. There it is. Sorry. It's all going to depend on the requirements and the bandwidth.

Is that what you said?

A. Yes, yeah. The requirements were these network transmission requirements. So the time it takes to deliver a segment.

Q. You would agree that in Ogden, one version of the presentation will be displayed on the network product network -- strike that.

You would agree that under -- strike that.

You would agree that in Ogden, one version of the presentation will be displayed when the network bandwidth is at one rate, and a different version of the presentation could be displayed if the network bandwidth drops to a different rate; fair?

A. That can happen, yes.

Q. Okay. Now we're finally to Column 2, lines 61 to 66, which you testified earlier is at least part of Ogden that supports your opinion in paragraph 74 of your report. I'm at line 61 starting with "For example."

Do you see that?

A. I'm there.

Q. So the first sentence in line 61 starts with the words, "for example"; correct?

A. Yes.

Q. And the next line Ogden uses the word "may."

Do you see that?

A. Yes.

Q. And the use of open-ended language such as, for example, "and may introduce concepts confirms that the examples that follow are nonlimiting." Agree?

ATTORNEY PAQUETTE: Objection. Form.

A. Depending on the context, that certainly can be true.

Q. Ogden's disclosure of one version being real time or animated video and another version being graphic slides are just examples. Agree?

A. Examples of a first version and another version, that's correct.

Q. Ogden is not limited to one version being real time or animated video and another version being graphic slides. Can we agree on that?

A. Yes.

Q. Let's read from Column 2, line 66 to Column 3, line 10.

A. Okay.

Q. Line 66 begins with "Thus, of a set of corresponding segments."

A. Okay.

Q. Column 2, line 66 to Column 3, line 10, "Disclose that the segments of a presentation version can be any combination of audio, images, animation or video"; correct?

A. Audio images, animation or video, yes, that's correct.

Q. Can you please turn to claim 9 of Ogden.

A. (Witness complies with request.)

Okay.

Q. Can you read claim 9 to yourself and let me know when you're done.

A. (Witness complies with request.)

Okay.

Q. Let's go through claim 9 together. Claim 9 starts, "The network presentation distribution system has claimed in claim 1, wherein, said first subcollection includes a first video portion."

Do you see that?

A. I do.

Q. The claim 9 discloses a first subcollection of segments that includes video. Agree?

A. Yes, it includes -- yes, includes a first video portion.

Q. Next, claim 9 says, "In said second subcollection includes a different second video portion that corresponds in content with said first video portion."

Do you see that?

A. I do.

Q. So claim 9 discloses a second subcollection of segments that also includes video, and the first video and second video corresponding content. Do you agree?

A. Yes.

Q. Claim 9 goes on to say, "What makes the first and second video portions different is that they have substantially different expected data transmission rates."

Do you see that?

A. I do.

Q. Do you agree that claim 9 is disclosing an embodiment where the first presentation version and the second presentation

version are both video?

A. I think what it's disclosing is a collection. The first collection has a video portion in it. And the second collection also has corresponding video portions in it. So part of this collection includes a video portion.

Q. The answer is yes?

A. My answer was what my answer was.

Q. Do you agree that claim 9 is disclosing an embodiment where the first presentation version and the second presentation version are both video?

A. No.

Q. What is the first presentation version in claim 9?

A. It is a collection or what they call a subcollection that includes a video portion. And the second subcollection or collection includes a video portion. So the collection is something that just includes -- a portion of the collection is a video portion.

Q. Do you agree that claim 9 is disclosing an embodiment where the first presentation version includes a subcollection that includes a video portion, and the second

presentation version includes a second subcollection that includes a video portion?

A. Yes.

Q. And it's your understanding that the first subcollection -- strike that.

And it's your understanding that the first subcollection of video and the second subcollection of video correspond in content. Agree?

A. No. There's no collection of video here. There's no subcollection of video. It's a subcollection that includes a video portion. So you're misrepresenting what Ogden is describing.

Q. What do you mean by "It's a subcollection that includes a video portion"?

A. That's what Ogden says, a first subcollection includes a first video portion. I'm just focusing on just literally what Ogden says.

Q. So let's look at what Ogden literally says. Let's go back to claim 9, okay?

A. I haven't left.

Q. Okay. Claim 9 discloses a network presentation distribution system as in claim 1 wherein said first subcollection includes a first video portion. Do you agree?

A. Yes.

Q. Next claim 9 says, "In said second subcollection includes a different second video portion that corresponds in content with said first portion." Correct?

A. Said first video portion, yes.

Q. Okay. So do you agree that Ogden claim 9 is disclosing an embodiment where the first presentation -- strike that.

Do you agree that claim 9 is disclosing an embodiment where the first subcollection includes a video portion and the second subcollection includes a video portion that corresponds in content to the first subcollection of video?

ATTORNEY WILSON: Object to the form.

THE WITNESS: Yeah. To make it clear, since you didn't include the first and second portions, claim 9 certainly says that the first subcollection includes a first video portion, and a second subcollection includes a different second video portion that corresponds in content to the first video portion. That, I agree.

BY ATTORNEY SHENG:

Q. So you would agree that claim 9 certainly says that the first subcollection includes a first video portion, and the second subcollection includes a different second video portion that corresponds in content to the first video portion; correct?

A. Agreed.

Q. And what makes the first and second video portion different is because they have substantially different data transmission rates. Agree?

A. That's -- no. I mean, that is a difference. That is a difference that Ogden is calling out, but he's not saying -- he or she -- is not saying that's what makes them different. But they are -- Ogden is pointing out that that is a difference.

Q. What other differences are there between the first video portion and the second video portion?

A. Well, I think what's within the scope of claim 9 is where they don't have the same -- the first video portion and the second video portion do not have the same content.

Q. So it's your testimony today that, even though claim 9 says that the first and second portions correspond in content, that they are different content?

A. No, I'm saying it's within the scope of claim 9 that they can have different content so long as that content of the second video portion corresponds with the content in the first video portion.

Q. Got it. So it's your testimony today that claim 9 -- it's your testimony today that the scope of claim 9 includes where the first video portion and the second video portion are the same content?

ATTORNEY WILSON: Objection. Form.

THE WITNESS: That's not disclosed here. Yeah, all this discloses is that the content just has to correspond -- sorry, between the second video portion and the first video portion.

BY ATTORNEY SHENG:

Q. You would agree that the first video portion and the second video portion could be the same content; right?

A. Well, I don't know that it could be the same content, because there has to be -- there has to be differences between them, because it says that the first and second video portions are substantially different respective data transmission rates. So they can't be exactly the same.

Q. It would be the same content, but at different bit rates; right?

A. That's not what this says.

Q. What does it say then?

A. It just says that the different portions have substantially different expected data transmission rates. So it's talking about the transmission, not something relating to, for example, to the coding.

Q. Does the scope of claim 9 include an embodiment where the first presentation -- strike that.

Does the scope of claim 9 include an embodiment where the first video portion and the second video portion are the same content?

A. Just sitting here today, I don't see how that could be the case and you would satisfy the rest of these -- the rest of the requirements

of claim 9.

Q. If they correspond in content, doesn't that -- doesn't that mean they are the same content?

A. I think a person with skill in the art understands that "corresponds" and "same" are different words.

Q. Would you agree that if I had a first video portion and a second video portion that corresponds in content, that includes them being the same content?

A. Ask that question in isolation from the rest of the claim, maybe, but as I say, because the rest of the claim says that they have different expected transmission rates, a person of skill would understand that -- I don't see how they can have the same content and have different transmission rates.

Q. Let's go to the abstract of Ogden.

A. Okay. (Witness complies with request.)

Q. Do you see about midway down where the abstract says, "Thus, if a low transmission data rate is detected."

Do you see that?

A. Not yet. Okay, got it.

Q. It says, "Thus, if a low transmission data rate is detected at a first high note, presentation elements of reduced size can be retrieved. Alternatively, if a higher transmission rate is detected at a second high note, presentation elements of greater size and corresponding enhanced quality of presentation could be achieved."

Do you see that?

A. I see that.

Q. Why would presentation elements of a greater size result in a corresponding enhanced quality of presentation?

ATTORNEY WILSON: Objection. Form.

THE WITNESS: Because what Ogden seems to be contemplating here is that for -- for the content that's being retrieved by the second client, quality is proportional to size.

ATTORNEY WILSON: I think we've been going for a little over an hour.

ATTORNEY SHENG: We can take five minutes.

ATTORNEY WILSON: Is that okay?

THE WITNESS: Sure.

THE VIDEOGRAPHER: The time is 1:26 p.m. We're now off the record.

(Recess taken from 1:24 p.m. to 1:34 p.m.)

THE VIDEOGRAPHER: The time is 1:34 p.m. We're now on the record.

BY ATTORNEY SHENG:

Q. Doctor, did you speak with anybody about your deposition at the break?

A. I didn't speak with anybody.

Q. Before the break, we were talking about the abstract of Ogden.

Do you recall that?

A. Yes.

Q. Do you agree that different bit rates of the same video will have different data transmission rates?

A. Undoubtedly, yes.

Q. And before the break I asked you why would presentation elements of a greater size result in a corresponding enhanced quality of presentation. Do you follow that?

A. I do.

Q. Do you agree that a picture would be clear with a higher resolution because there are more bits?

A. I don't understand your question.

Q. Would you agree that an enhanced quality of presentation could be the result of there being more bits?

A. I need some context here.

Q. So let's say the media has encoded a higher bit rate that would result in enhanced -- in enhanced quality; correct?

A. If -- if you had some media and you encoded it at a higher bit rate, it should have some impact on quality, yes.

Q. In the context of claim 9 in Ogden, do you agree that the expected data transmission rates of one of the claimed video portions will depend on the size of the file?

A. I'm sorry, just ask the last part again. Do I agree that the transmission rate would depend on the size of the file?

Q. Do you agree that the expected data transmission rate of one of the claimed video portions could be affected by the size of the file?

A. Could be affected by the size of the

file?

Q. Sure.

A. Yes, it could be affected by the size of the file.

Q. If a file is 100 kilobits and you have a 100-kilobit per second connection, all other things being equal, you would expect to download this file in one second; correct?

A. Things are never that simple. You know, if you're talking about to your next-door neighbor, you're not a technologist, sure, you can say that.

Q. And if the file was 200 kilobits and you had a 100-kilobit per second connection, all other things being equal, your neighbor might expect the download to take two seconds. Is that fair?

A. All other things being equal, you would expect it to take twice as long, not two seconds.

Q. Do you agree that a higher expected transmission rate means that the Ogden system would select the larger size presentation element?

ATTORNEY WILSON: Objection. Form.

THE WITNESS: Just ask the question again.

BY ATTORNEY SHENG:

Q. The Ogden system would select a larger size presentation element if the expected transmission rate is higher; correct?

ATTORNEY WILSON: Objection to form.

THE WITNESS: I don't recall, as I say, a disclosure in Ogden of the end users selecting larger content as a function of network conditions.

ATTORNEY SHENG: Could you mark this as Jaffay Exhibit 8.

(Exhibit 9 was marked for identification.)

BY ATTORNEY SHENG:

Q. Could you turn to page 4 of Jaffay Exhibit 9.

A. (Witness complies with request.) Okay.

Q. Are you familiar with the images on pages 4 and 5 of Dish's -- of this document -- let me back up.

Do you agree that Jaffay Exhibit 9 is

Dish's POR in support of the '138 patent?

A. That's what it appears to be.

Q. Okay. Let's go to page 4 of Dish's POR. Are you familiar with the images on pages 4 and 5 of Dish's POR?

A. Yes.

Q. Did you help create these images?

A. No.

Q. Do you know what the images are attempting to show?

A. Yes. They are attempting to show how in PowerPoint '97, you could embed a link to a video in a slide, or you could have stills from the video on a slide with text content, and you can have -- or you can just have the text that was being spoken.

So you can either have a video of some -- to make some point, you could have images that make that same point, or you could just have the text that makes the same point.

Q. Do you agree that version 2 on page 4 can include stills from the video from version 1?

ATTORNEY WILSON: Object to the form.

THE WITNESS: Yes. It's not from version 1. It's from the video that's linked to in the slide on version 1.

BY ATTORNEY SHENG:

Q. If a user clicked on the video link in version 1, do you agree that the video would begin to play?

A. If you had access -- if the machine was connected to the internet and there's no access issues, the video would buffer and then it would play.

Q. It would be streamed to the user; correct?

A. Streamed only in a progressive download sense.

Q. So previously we talked about claim 9, and I believe you testified that the first presentation version in claim 9 was a video portion, and the second subcollection was a second video but in -- but they were different content.

Is that a fair characterization of your testimony?

ATTORNEY WILSON: Objection. Misstates testimony.

THE WITNESS: All that was

required was that the content corresponds. The content in the second video portion of the collection corresponds to the first video portion in the first collection.

BY ATTORNEY SHENG:

Q. And the video in the first video portion, the video in the second video portion are not the same content. Is that what you testified earlier?

A. That's not stated in claim 9. All that's stated in claim 9 is that the content corresponds.

Q. So the content could be the same in claim 9. Agree?

A. Well, you've asked that several times, and what I said is just sitting here today, I don't see how it could be the same content, given that the remainder of the claim talks about that the distinction is that the video portions have substantially different expected data transmission rates.

Q. Do you agree that on page 4 of Dish's POR, version 1 and version 2 correspond in content?

A. They could.

Q. They could not?

A. I think this video is a training video for Blockbuster employees, and the big take-home from the video is as a new employee, you know, you're supposed to listen, think and act. That was the big take home.

So at that level, the second version would correspond -- the message of the second video -- sorry, the second version corresponds to the message in the first version.

Q. Did you have any involvement in the creation of these images?

A. No.

Q. How do you know that the first video was a Blockbuster training video?

A. I've watched the video. I didn't physically make these, but I know what the content in here is.

Q. Did you provide counsel with the Blockbuster University image there, the Blockbuster video training video?

A. No.

Q. If you had to recreate these images to reflect claim 9's disclosure of a first

presentation version being a video and the second presentation version also being a video but not corresponding in content, what would version 2 of page 4 look like?

ATTORNEY WILSON: Objection. Form.

THE WITNESS: I don't know. I don't think I can do that off the top of my head. I'd have to go off and think about that.

BY ATTORNEY SHENG:

Q. So sitting here today, you don't know how you would be able to modify version 2 on page 4 to reflect the video that corresponds in content to version 1 but is not the same content as version 1. Fair?

ATTORNEY WILSON: Same objection.

THE WITNESS: Sitting here in a deposition, you're asking me to do something that I haven't done, that I haven't considered, and all I'm saying is that I just -- in the context of a deposition, I can't do that on the fly.

BY ATTORNEY SHENG:

Q. The image of version 1 is a frame

that says "Blockbuster University." Is that right?

A. It's -- I mean, I don't know if I'd call it a frame-- yeah. I can accept that.

Q. So if you had to recreate these images to reflect claim 9's disclosure of a first presentation being a video and the second presentation version also being a video, what would the two images look like?

ATTORNEY WILSON: Objection. Form.

THE WITNESS: Again, you're asking me to do something I haven't done. This is like a 16-minute video, as I recall. I haven't watched it recently. I'd have to go back and watch the video and think about how to make a second corresponding video portion of it.

BY ATTORNEY SHENG:

Q. So you would take the video in version 1 on page 4 and create a different video that corresponds in content; correct?

A. No. I'm saying in order to answer your question, I'd have to go back and watch the video to remind myself of exactly the contents of the video.

Q. It's your testimony today that even though version 1 and version 2 would both be videos, they would comprise different content?

A. I haven't testified at all about any version 2 being video. Version 2 here is not video. Version 2 on page 4, whatever exhibit this is, Exhibit 9, is not video.

Q. It's a link to the video?

A. No. It's images and text.

Q. Version 1 is a video. Can we agree on that?

A. Version 1 is a link to the video.

Q. Person with skill in the art implementing Ogden's invention who wanted to create two versions of video -- strike that.

So if we wanted to recreate these images to reflect claim 9, it's your testimony that version 1 and version 2 is the different videos corresponding in content, but they wouldn't be the same content. Agree?

A. If I was able to do that, that, I think, would satisfy claim 9.

Q. So a person of skill in the art trying to implement Ogden's invention would create two completely different videos. Is that your

testimony?

A. That's certainly -- if you ask me to create a second version of the video in version 1 that corresponds in content and has a substantially different expected data transmission rate, I would create a shorter video that has the same message as the video in version 1.

Q. But a shorter video wouldn't have substantially the same duration; correct?

A. No, it would be shorter.

Q. Okay. So if I wanted to create -- or if a person with skill in the art wanted to recreate claim 9, two videos of substantially similar duration, is it your testimony that they would create two different videos?

ATTORNEY WILSON: Objection. Form.

THE WITNESS: Well, there's no requirement in claim 9 that I see for having the same duration. So you're adding requirements that I don't believe were present in claim 9.

BY ATTORNEY SHENG:

Q. Why wouldn't a person with skill in the art use the same video for version 1 and for

version 2 use the same versions, but at a lower bit rate?

ATTORNEY WILSON: Objection. Form.

THE WITNESS: They may not have that capability. I mean, it's important to understand that there's nothing in the '137 patent at all about coding or encoding or compression or any of that. So it's just using stock video.

So there's no teaching or suggestion of taking content and making lower bit rate versions of it. Taking the exact same content. What Ogden is all about is having alternate or replacement content.

BY ATTORNEY SHENG:

Q. If you were to recreate version 1 and version 2, two videos, you would have actors acting out version 1, acting out a scene and different actors acting out the second version?

ATTORNEY WILSON: Objection. Form.

THE WITNESS: Or I would splice them out of version 1. That was it.

BY ATTORNEY SHENG:

Q. Let's go back to the Ogden exhibit, which is Exhibit 1004.

A. Okay.

Q. Give me a second.

A. Sure.

Q. You don't happen to remember what number it was, anybody?

A. Ten is the next number. No, the Ogden. It's unmarked.

Q. Here it is.

Please turn to figure C of Ogden.

A. C. (Witness complies with request.)

Q. Figure 2C.

A. Okay. I'm there.

Q. Are you familiar with figure 2C of Ogden?

A. Yes.

Q. I'm going to ask you questions starting at step 508 in figure 2C. Why don't you review figure 2C, the figure before or after.

A. Sure.

Q. Let me know.

A. Okay, I'm ready.

Q. At step 508 at figure 2C in Ogden,

the host sends a command to the client presentation software on the fly; correct?

A. Yes.

Q. And that command indicates one or more video segments from one or more presentation versions to present to the user; correct?

A. From -- for one or more of the presentation versions, yes.

Q. The command also indicates a list of network addresses from a content web server from which the segments could be retrieved; correct?

A. Yes.

Q. The next step is 516.

Do you see that?

A. I do.

Q. And step 516, the client presentation software checks whether they requested one or more video segments is cached at the client; correct?

A. Yes.

Q. If the answer is yes, the system will go down to step 548; correct?

A. 548. Yes. That looks right.

Q. At step 548, the system will check if a host interrupt is detected; correct?

A. Yes.

Q. So let's go to Column 25, lines 24 to 27.

I'll read those lines into the record. "Assuming that no host interrupts in steps 548, then steps 552 through 560 are interrably [phon.] performed until all segments of the current collection of segments are presented to the client."

Do you see that?

A. Yes.

Q. Is that your understanding of how the Ogden system works?

A. I think this is all one embodiment of Ogden, but for that embodiment, this is part of how it works.

Q. Let's go back to figure 2C, step 516.

A. I'm sorry, which one, 516?

Q. Yes.

A. 516, hang on. Yes, got it.

Q. So we've established earlier that step 516, the client presentation software checks whether the requested one or more video segments is cached to the client; correct?

A. Yes.

Q. So if the answer at step 516 is no, meaning that the requested video segment is not cached locally. Instead of going step 548, the system will go down to step 524; correct?

A. Yes.

Q. And at step 524, the client presentation software on the client will select a content web server; correct?

A. Let me read this.

Okay. Could you just ask your question again.

Q. At step 524, the client presentation software on the client will select a content web server; correct?

A. Yes.

Q. The client presentation software on the client will also select which segments to be requested from the content web server; correct?

A. Specifically, it's going to request a -- what Ogden refers to as a collection, which is a set of -- specific set of segments.

Q. At step 528, the client will request the segments from the content web server; correct?

A. Yes. In 528, the client browser is

going to make a request to the selected content web server for the collection of segments.

Q. The system will then go to step 532 and store the segments it receives from the content web server into the cache on the client; correct?

A. That's not disclosed, but that seems to be implied.

Q. If the segments are cached within the desired time, the system will make its way to step 548, which we discussed earlier; correct?

A. Yes.

Q. And assuming that no host interrupt is detected in step 548, then steps 552 to 560 are interrably performed until all segments of the current collections of segments are presented to the client; correct?

A. Yes.

Q. Okay. So let's go back to Exhibit 1 1001, which I also marked previously as Exhibit 8, Jaffay Exhibit 8. It's the '138 patent.

A. Okay.

Q. If you can turn to video 9 of the '138 patent.

A. I'm there.

Q. Actually, let's briefly turn --

well, are you familiar with figure 9 of the '138 patent?

A. I've certainly seen it before.

Q. Let's go to Column 16, lines 33 to 35.

A. 16, 33 to 35. Okay.

Q. I'll read that into the record. "Figure 9 is a schematic flow chart diagram illustrating one embodiment of a method 900 reviewing a plurality of streamlets in accordance with the present invention."

Do you see that?

A. I do.

Q. The word "method" for viewing streamlets, fair to say it is a method for streaming streamlets to the user?

A. Where are you seeing method -- you said method for reviewing a plurality of streamlets, is that what you're referring to?

Q. No. I'm referring to the language that says method-- yes, you're right. Method for viewing a plurality of streamlets. Can we agree that that means streaming streamlets to the user?

A. Let me look at the figure.

Q. Let me strike that question.

Terrible question.

Figure 9 shows a method for how streamlets are streamed to a user in accordance with the invention. Fair?

A. This is not the description in the figure. For whatever reason, '138 keeps on describing it as an embodiment of a method for viewing a plurality of streamlets.

Q. That's sort of what I'm getting at. Is that just another way of saying it's a method for streaming streamlets to the user?

A. Well, it's part of a method. I mean, it's just a single -- because this is only describing the -- because there's no looping in here. This seems to just be describing, requesting and delivering a single streamlet.

Q. Why don't we just talk about the figure.

A. Okay.

Q. At step 904, an agent controller module is provided. Agreed? I'm reading straight from the figure.

A. I understand.

Q. Okay.

A. So an agent control -- agent

controller module is provided and associated with the viewer for this client.

Q. So the answer is yes, at step 904 an agent controller module is provided; correct?

A. Yes.

Q. At step 906 -- strike that.

Am I correct that the agent controller module is located at the client?

ATTORNEY WILSON: Objection. Form. It's not clear whether you're reading from a figure or what you're asking Dr. Jaffay to render an opinion.

THE WITNESS: What was the question?

BY ATTORNEY SHENG:

Q. Is the agent controller module located at the client?

A. Yes.

Q. At step 906, the agent controller module requests a streamlet; correct?

A. Correct.

Q. At step 908, the agent controller module checks whether the requested streamlet is stored locally; correct?

A. I don't know that the '138 patent

uniquely discloses which module performs step 908.

Q. If you take a look at Column 16, lines 42 to 45, let me know if that refreshes your recollection.

A. That's what I was reading.

Q. Well, why don't I read that into the record. "If the streamlet is stored 908 locally in the streamlet cache 710, the streamlet cache module 704 retrieves 910, to streamlet 304 and sends the streamlet to the agent controller module 702."

Do you see that?

A. I do.

Q. So I guess my question is at step 908, the agent controller module checks whether the requested streamlet is stored locally; correct?

A. It's not saying in here which entity performs step 908.

Q. What is your understanding of which entity performs step 908?

A. It was certainly done on the client. It's just not a function that's disclosed as being part of the agent controller module.

Q. Locally means in a cache on a client; agree?

A. So that's a different topic, and

yes. Locally here means a cache on the client.

Q. Except 908, does the agent controller module on the client check whether the requested streamlet is cached at the client?

A. It doesn't say. We would certainly know that at the client you make a check to see if the streamlet is stored in the streamlet cache, but as I say, it just doesn't, doesn't specifically say which entity performs that step.

Q. You would agree that at step 908, some entity, part of the system, checks whether the requested streamlet is cached by the client; correct?

A. Yes.

Q. If the answer is yes, the system will go down to step 910; correct?

A. Yes.

Q. At step 910, the system will retrieve the streamlet from the cache on the client; correct?

A. Yes.

Q. After the streamlet is retrieved this step 910, the system will perform the remaining steps until the streamlet is delivered and presented to the client in step 914; correct?

A. Sorry. After it's retrieved, you're saying steps 9 through 14 are performed. Sorry, 11 through 14 are performed?

Q. Let me rephrase the question so it's clear.

After the streamlet is retrieved in step 910, the system will perform the remaining steps until the streamlet is delivered and presented to the client in step 914; correct?

A. Yes, I think that is correct.

Q. If the answer at step 908 is no, meaning that the requested streamlet is not cached locally, instead of going to step 910, the system will go down to step 916; correct?

A. Yes.

Q. At step 916, the client will request the streamlet from a streamlet server; correct?

A. That's what the figure appears to indicate.

Q. At step 916, the client will request the streamlet from a streamlet server; correct? Sorry, I asked you that question already. Strike that.

The system will then go to step 918 and store the streamlets it received from the streamlet

server on the cache of a client; correct?

A. That's what the figure indicates.

Q. And then after the streamlet is archived, the system will then go to step 910, which is to retrieve the streamlet from the cache on the fly; right?

A. Yes.

Q. And after the streamlet is retrieved in step 910, the system will perform the remaining steps until the streamlet is delivered to the client in step 914; correct?

ATTORNEY PAQUETTE: Objection. Form.

THE WITNESS: Well, the streamlet is on the client. The streamlet has already been delivered to the client at this point.

BY ATTORNEY SHENG:

Q. Right. So after the streamlet is retrieved, the system will perform the remaining steps until the -- oh, I see what you're saying.

A. So my comment would apply to your earlier questions about steps, when you said 9, 11 through 914 would be performed. The delivered part I think is wrong.

Q. Let me reask.

After the streamlet is retrieved in step 910, the system will perform the remaining steps until the streamlet is delivered to the client for display in step 914. Fair?

ATTORNEY WILSON: Objection. Form.

THE WITNESS: No. That's not what's happening.

BY ATTORNEY SHENG:

Q. What's happening?

A. Deliver is not to the client. It's already at the client. The deliver for 914 means that it goes to the viewer. The viewer on the client.

Q. So after the streamlet is retrieved in step 910, the system will perform the remaining steps until the streamlet is delivered to the viewer on the client. Fair?

A. Fair.

Q. And that would apply to your previous question and answer that you corrected a minute ago. Is that correct?

A. Correct.

Q. And the system will repeat this

process for each of the successive streamlets; is that correct?

ATTORNEY WILSON: Objection. Form.

THE WITNESS: No. I mean, there's more to it than just figure 9. So figure 9 is just describing a single one, and all of this is happening in combination with at least figure 10.

Q. But you would agree that this process is repeated for each subsequent streamlet. Agree?

ATTORNEY WILSON: Object to form.

THE WITNESS: Well, I don't know how to answer your question. I mean, this and additional steps are repeated.

BY ATTORNEY SHENG:

Q. You would agree that the steps in figure 9, in addition to other steps, would be repeated for each subsequent streamlet. Agree?

A. Yes.

Q. Let's go to paragraph -- let's pull up Exhibit 2006, which is your declaration in support of Dish's POR. It's paragraph 124.

A. 124. Okay, I'm there.

Q. Paragraph 124, you argue that the language a streamlet request found in claims 14, 23, and 28 of the '138 patent requires the client to place a single request to a server for a single streamlet. Is that correct?

A. That is what I write.

Q. And you don't cite any portion of Dish's ABR patents for that opinion; right?

A. Well, I'm quoting the claim language. I guess I don't have -- I mean, I say that it's -- that the phrase a streamlet request appears in claims 14, 23, and 28.

So I am -- I'm not citing it, but I'm quoting it, and I'm quoting it, and I'm saying where the quotes come from, I'm effectively citing.

Q. If the prior art disclosed a single request for two streamlets, would that meet this claim element?

ATTORNEY WILSON: Objection. Form.

THE WITNESS: If the prior art disclosed a request for two streamlets, a single request for two streamlets, that's not what the ABR patents are claiming.

BY ATTORNEY SHENG:

Q. If the prior art disclosed a single request for one or more streamlets, would that meet the claim elements?

ATTORNEY WILSON: Objection. Form.

THE WITNESS: If the prior art had streamlets like the ABR patents but disclosed requesting one or more in a single request, the -- if it actually placed "or more," more than one in a single request, that would not satisfy this claim language.

BY ATTORNEY SHENG:

Q. But one or more includes just one; correct?

A. One or more includes just one, but a disclosure of one or more I don't think is a disclosure of one and only one.

Q. Is it your opinion that the '138 patent requires one and only one request for one and only one streamlet?

ATTORNEY WILSON: Objection. Form.

THE WITNESS: No, you ultimately

request multiple streamlets, but each request -- a single request -- you have to make a single request for a single streamlet, for each single streamlet.

BY ATTORNEY SHENG:

Q. Do you have Ogden in front of you still?

A. It hasn't gone away. Yes.

Q. Go to Column 22, lines 30 to 33.

A. 22, 30, 22.

Q. I'm looking at the sentence --

A. Give me the line numbers again.

Q. 30 to 33.

A. Okay, thank you. Thirty-three, got it.

Q. And the sentence beginning "The time for each network."

Do you see that?

A. I'm with you.

Q. Could you read that to yourself and let me know when you're done, lines 30 to 33.

A. (Witness complies with request.)

I'm there.

Q. Ogden discloses that a collection of segments can be one or more presentation elements.

Agree?

A. Yes. It gives that as an example.

Q. And each presentation element can have one or more segments. Agree?

A. Yes.

Q. So Ogden discloses that a collection of segments can be just one presentation element. Agree?

ATTORNEY WILSON: Objection. Form.

ATTORNEY SHENG: What's the objection, Counsel.

ATTORNEY WILSON: That's not what Ogden says. Misstates testimony.

ATTORNEY SHENG: Whose testimony?

ATTORNEY WILSON: I'm sorry, misstates evidence.

BY ATTORNEY SHENG:

Q. You can answer, Doctor.

THE WITNESS: Well, I view this as really a statement, not about what is in a collection but really the time to transfer -- the time to transfer one or more presentation elements, each element potentially having one or more segments.

BY ATTORNEY SHENG:

Q. Does Ogden disclose that a collection of segments can be just one presentation element?

ATTORNEY WILSON: Objection. Form.

ATTORNEY SHENG: Counsel, what's the objection?

ATTORNEY WILSON: The same objection.

THE WITNESS: I think, as I say, this is a statement about the time to transfer a collection of segments. I don't think this is defining what constitutes a collection of segments. It says the time to transfer a collection of segments can be, for example, the time to transfer one or more presentation elements.

BY ATTORNEY SHENG:

Q. Do you agree that Ogden discloses that there could be a transfer of a collection of segments that includes just one presentation element?

A. I agree that what Ogden is saying is

that the time to transfer a collection of segments can be the time to transfer one or more of the presentation elements in a collection.

Q. Okay. So we agree that Ogden discloses that there could be a transfer of a collection of segments that includes just one presentation element?

A. No. I'm not agreeing with that.

Q. So it's your opinion that the '138 patent, the language "a streamlet request requires a single streamlet," a single request for a single streamlet. Agree?

A. Yes.

Q. Do you have Exhibit 7 still, which is what I handed to you?

A. Nothing has gone away, so I just got to find it. Could you just tell me what it is.

Q. It's the '555 patent. Dish's '555 patent.

A. Yes, I have that, yes, got it.

Q. So Jaffay Exhibit 7 is Dish's '555 patent. Agree?

A. Yes, that's what it appears to be.

Q. The 555 patent is one of the ABR patents. Agree?

A. Yes, that is correct.

Q. And the '555 patent shares the same specification as the earlier ABR patents. Can we agree on that?

A. Yes, that's my recollection.

Q. Could you please turn to claim 10 of the '555 patent.

A. Okay. I'm there.

Q. Review it itself and let me know when you're done.

A. All right. Give me a minute.

Q. I want to focus on the third-to-last limitation of claim 10, but why don't you go ahead.

A. Sure. (Witness complies with request.)

Okay, I've read it.

Q. So I want to focus again on the third-to-last limitation of claim 10, and I'll read it into the record. "Place a streamlet request to the server over the one or more network connections for the selected stream."

Do you see that?

A. I do.

Q. And this limitation has the same language, a streamlet request, as does claims 14,

23, and 28, the '138 patent. Agree?

A. Yes.

Q. So one of the steps of claim 10 of the '555 patent is to place a streamlet request; correct?

A. Yes.

Q. That is a streamlet request, a single request. Agree?

A. Correct.

Q. Go to the very next limitation, I'll read that limitation into the record.

"Receive the requested streamlets from the server via the one or more network connections."

Do you see that?

A. I do.

Q. Do you agree in response to a single streamlet request the device of claim 10 will receive multiple requested streamlets?

A. No.

Q. Why not?

A. I think a person of ordinary skill in the art would just read this as saying that what's being described here is the use of a persistent connection, a persistent HTTP connection. So place a streamlet request to a

server is very clear and unambiguous to a person of skill in the art, and the next limitation, I think, tells a person with skill in the art that the subsequent requests are going to be made over the same network connection.

So what it's really communicating is the use of a persistent connection. It's not saying that you get multiple streamlets per request. So because, for example, when it says "Receive the requested streamlets," that tells a person of ordinary skill in the art you're talking about multiple requests. So it's not talking about the single request above.

And as I say -- and this makes perfect sense -- this is just a requirement that you use persistent connections to the server. That the client uses persistent connections to the servers to get all streamlets.

And this makes sense because, as we teach in networking classes, then you don't have the overhead of tearing down and reestablishing the connection for every request, and this is going to be important when, as when Brueck describes, you have on this one, Brueck, if you're going to have these streamlets be of small duration, then, you

know, amortizing the connection establishment time across multiple requests is going to be important.

Q. Do claims 14, 23, and 28 of the '138 patent require a persistent connection?

A. 14, 23 and 28.

Q. Let's start with claim 14. Does claim 14 require the client use persistent connections to the servers to get all streamlets?

A. Well, claim 14 depends from claim 10, and it doesn't overwrite that requirement. So claim 14 would also require persistent connections.

Q. So it's your opinion that claims 14, 23, and 28 in the '138 patent where it states "a streamlet request" can only request a single streamlet. Agree?

A. Well, I haven't looked at the other claims.

Q. Claim 14. Let's focus on claim 14?

A. Claim 14. Yes, claim 14 says you get a -- you place a streamlet -- a streamlet request, so a single request, and the next limitation, again, is saying is that for the subsequent requests you use the same -- you reuse the same connection.

Q. Doctor, how are you doing? Keep

going or do you want a break?

A. I'm fine, just getting a little tongue twisted.

Q. Handing you what's previously been marked as Exhibit 1005.

A. Thank you.

Q. Actually, I got one more question for you related to the previous claim 14 of the '138 patent.

A. Let me just get back there. Are we at '555?

Q. No, we're back at the '138 patent. Dish's '138 patent, and we were talking about claim 14. I think I had asked you whether or not claim 14 requires a persistent connection.

A. Hold on.

Q. Sure.

A. I don't have the '138 out. I thought we were on the '555.

Q. We were going between the two.

A. Claim 14 you're asking about is of the '555.

Q. No. I was asking about claim 14 of the '138 patent.

A. Oh, my God.

Q. Okay. Let's back up. Let's clarify the record.

A. Okay. Let me go back and find the '138. I know I didn't have that out. Where is it? I keep saying -- oh, here it is. Here it is. Yes.

Sorry. I was on the completely wrong patent.

Q. No problem. Why don't we back up a little bit.

So we were looking at claim 10 of the '555 patent. And just to summarize, just to orient ourselves, I think we established that claim 10 of the '555 patent recites a streamlet request.

A. Yes.

Q. But also recites that the system receives the requested streamlet --

A. Yes.

Q. -- to the server is that right?

A. Yes, exactly.

Q. Your opinion -- and please correct me if I'm wrong -- your opinion was that the system here of claim 10 still requires that -- a streamlet request requires -- a streamlet request is a single request for a single streamlet. Is that fair?

A. Correct.

Q. And I believe your explanation generally was that a person of skill in the art reading claim 10 of the '555 patent would understand there to be, I think you said persistent connections. Is that --

A. The next limitation that you then pointed me to about receiving the requested streamlets via the one or more network connections that that was a requirement, that when you place these individual streamlet requests, you reuse the previous connection. And that's what's called persistent connections. The use of persistent HTTP connections. Persistent connections.

Q. Does the persistent connection mean only one TCP connection is required?

A. Yes, that's why you do it. As I say, in particular, when you're requesting small content, you want to amortize the overhead of establishing a connection over multiple requests, so you're using a single connection multiple times.

Q. Let's move on. Let's go on to -- let's put the '555 patent away.

A. Away?

Q. Yes. And I believe did we have -- did we mark an exhibit?

A. Allen.

Q. Are we up do that? Are we up to Exhibit 1 --

A. I think you said it was already marked.

Q. You're right, Exhibit 1005, you're right. So Exhibit 1005 is the Allen reference, agree?

A. Yes. That's what it appears to be.

Q. How many times have you read the Allen reference cover to cover?

A. I don't know. Several.

Q. The Allen reference is over 120 pages, not including figures.

A. Yes, it is.

Q. And you reviewed the Allen reference several times cover to cover; is that correct?

A. Yes.

Q. Can you turn to page 24 of Allen.

A. (Witness complies with request.)

Q. And there's a paragraph starting at line 19 that I'd like to ask you about.

A. I'm there.

Q. The paragraph starts with another aspect of the present invention.

Do you see that?

A. I do.

Q. Do you agree that one of the aspects of Allen's invention is a distribution system and method that allows video producers to supply an improved live streaming experience to multiple simultaneous users?

A. I believe that is Allen's belief.

Q. And Allen aims to supply such an improved live streaming experience to multiple simultaneous users independent of the user's individual viewing device, network connectivity, bit rates and supported streaming formats; correct?

A. That is what Allen states.

Q. Allen systems implies an improved live streaming experience by generating and distributing a single live internet stream to multiple EDGE encoders. Do you agree?

A. That's part of what Allen does, yes.

Q. And each of the multiple EDGE encoders of Allen converts the live internet stream into format and bit rates matched to each viewer; correct?

A. Correct.

Q. Assuming the characteristics of each

viewer's device are not identical, the multiple EDGE encoders in Allen will convert the live internet stream into different formats and different bit rates. Agree?

A. As I recall, each encoder is only going to do -- is only going to do one encoding, but the encoders that are distributed across the network, between them they can do different encodings.

Q. So assuming the characteristics of each viewer's device are not identical, the multiple EDGE encoders in Allen will convert the internet stream into different formats and different bit rates. Agree?

A. As a collection that's true, but, again, each encoder is only generating one format and bit rate.

Q. What do you mean, "as a collection"?

A. As a selection of the encoders. Take all the encoders that Allen will put at the last mile pop, that collection of encoders.

Q. So assuming the characteristics of each viewer's device are not identical, you would end up with streams that are in different formats and different bit rates. Agree?

A. At different parts of the network, yes.

Q. In other words, the multiple EDGE encoders in Allen will not convert the live internet stream all into just one bit rate; correct?

A. They certainly may, but given the way you're -- if you wanted to add your assumption back in, then the answer would be they wouldn't.

Q. The only way the multiple EDGE encoders in Allen would convert the live internet stream into just one bit rate is if every viewer device is identical; correct?

ATTORNEY WILSON: Objection. Form.

THE WITNESS: No, I think there's other scenarios where it could generate the same format.

BY ATTORNEY SHENG:

Q. Can you provide me one example of one of those scenarios?

A. Where they have comparable, compatible viewers, and they have the same network connectivity at the different -- on the different last mile segments of the network.

Q. How likely is that?

ATTORNEY WILSON: Object to the form.

THE WITNESS: Depends on your environment. If you're doing this at UNC, it would be incredibly likely.

BY ATTORNEY SHENG:

Q. What if we're dong it at my house at Palo Alto?

A. Well, your house -- your house is just one viewer.

Q. Let's assume viewers are spread out across the country. Let's say 100 viewers spread across the country, what are the chances that all 100 viewers will have identical formats and bit rates?

ATTORNEY WILSON: Objection. Form.

THE WITNESS: Don't know. I mean, these things more often it's the tail wags the dog, where something becomes popular and people make sure they have the same players. I mean, this is what happened with the MBone. MBone initially thought they were going to have to

transfer and empty out the different formats, and in the end they were pretty much able to use a different format to reach virtually all of the users.

BY ATTORNEY SHENG:

Q. Well, so a user on an iPhone, for example -- let's assume there's a user on an iPhone, user on an Android, user on a computer, user on a Smart TV, what are the chances that all four of those users would receive the media in the exact same format and bit rate?

A. Allen is before smarts TVs and the iPhone. So your question -- I don't know how to answer your question. Those things didn't exist at the time of Allen.

Q. Allen places the responsibility for encoding the video and audio stream at the edge of the network where the encoder knows the viewers' viewing device, format, bit rate network and connectivity; correct?

A. Allen does put its intelligence at the edge of the network, and then I couldn't follow the second half of your question.

Q. Allen discloses an improvement over other systems that place the burden of encoding at

the source; correct?

A. Yes.

Q. And that's because servers at the source know little about the end user and must, therefore, generate a few formats that are perceived to be the lowest common denominator. Agree?

A. That was Allen's contention.

Q. Let's go back to Exhibit 2006, which was your expert report.

A. 2006.

Q. POR.

A. Okay.

Q. I'm looking at paragraph 138.

A. 138. Got it.

Q. In paragraph 138, you appear to quote claim 6 of the '138 patent.

Do you see that?

A. I see that.

Q. You state that claim 6 recites a plurality of web servers located at different locations across the internet that are each configured to retrieve streamlets from the storage device in response to client requests.

Do you see that?

A. Yes.

Q. In paragraph 138, you have the words "the storage device" in quotes, but you also have brackets in the quotes between the words "in storage."

Do you see that?

A. I do.

Q. Those brackets indicate that you omitted some words?

A. I think that is correct.

Q. What are the words that you replaced with those brackets, do you know?

A. We're just going to have to look at claim 6. I don't recall.

Q. Sure. Ogden Exhibit 1004.

A. I think this is a statement about the patent, not Ogden.

Q. I'm sorry. You're right. Claim 6 of the '138 patent.

A. Right.

Q. '138 patent is --

A. I got it. Exhibit 8.

Q. Yes.

A. Claim 6. It looks like the brackets clip out at least one.

Q. So you left out the words "at least one"; correct?

A. I think that is correct.

Q. Claim 6 of the '138 patent actually says, "Be at least one storage device." Agree?

A. Retrieved, yes, retrieved from at least the one storage device, yes, I agree.

Q. At least one storage device means there could be one storage device. Agree?

A. Correct.

Q. There could be two storage devices; correct?

A. Correct.

Q. There could be three storage devices; correct?

A. Sure.

Q. Let's go back to paragraph 138.

A. Okay.

Q. In the second sentence of paragraph 138, you state, "Thus, these claims require different web servers that in response to client requests each retrieve content from the same central storage device."

Do you see that?

A. Yes, I see that.

Q. And you don't cite any portion of the '138 patent specification to support this opinion; correct?

A. That's correct.

Q. We just established that claim 6 recites at least one storage device that allows multiple storage devices; correct?

A. Well, let me read the whole thing then and make sure I'm getting this right.

Okay. Could you just ask your question again.

Q. We established that claim 6 recites the -- at least one storage device that allows for multiple storage devices; correct?

A. Yes.

Q. How can claim 6 require that different web servers retrieve content from the same central storage device if the claim allows for multiple storage devices?

A. I think maybe this is just worded inartfully here, but I think the idea is that the storage devices -- the at least one storage device, is shared between all of the servers. And so that's -- that's this notion of the central storage device.

So the device itself you can think of as logic as having multiple disks, but it's a centralized repository that all of the different web servers pull from.

I think that's the point that I'm trying to convey here.

ATTORNEY SHENG: We've been going for a little over an hour.

Doctor, do you want to take five minutes?

THE WITNESS: If we have to.

THE VIDEOGRAPHER: The time is 2:45. We're off the record.

(Recess from 2:43 p.m. to 2:57 p.m.).

THE VIDEOGRAPHER: Time is 2:57 p.m. We're now on the record.

BY ATTORNEY SHENG:

Q. Could you turn to paragraph 141. Doctor, did you talk to anyone during the deposition?

A. No.

Q. Could you turn to paragraph 141 of Exhibit 2006.

A. Okay.

Q. Paragraph 141 of your expert report, you argue that Ogden's scripts cannot be a virtual timeline because the claims at issue require that the client sends a request for the virtual timeline for the server, and the server responds by sending the virtual timeline to the client. Is that accurate?

A. Right. The client has to request it from the content, from the web server. The content server.

Q. So in your opinion, the claims require that the client sends a request to a server, and the server sends the virtual timeline back to the client. Fair?

A. Yes. And, as I say, as I recall from the claim language, it's the content server, it's not just sending the request to any old server.

Q. It's your opinion in paragraph 141 that Ogden has a host that requests scripts from a server, and the host then sends the scripts to the client; correct?

A. The host gets the script from the content manager. The host -- then there's language in Ogden about how the host then can modify and

customize the script. And then the host sends the script to the client.

Q. Is the host in Ogden a server?

A. It's a funny sort of server, because it's -- it's something that's pushing content to the client. So it tells the client what segments to request, and it -- yeah, by sending the virtual timeline.

(Exhibit 10 was marked for identification.)

Q. Let's go to the '138 patent, which is marked as Jaffay Exhibit 10.

A. Okay.

Q. Let's turn to figure 6A.

A. 6A. All right. I'm there.

Q. Are you familiar with figure 6A?

A. Yes.

Q. What is figure 6A showing?

A. I don't remember.

Q. We'll talk about this. Sitting here looking at figure 6A, are you able to tell me what figure 6A shows?

A. This is its notion of, recalls the virtual timeline, and I am just trying to remind myself of their acronyms.

Q. Can I turn to -- I think what you're looking for is Column 12, lines 31 to 43.

A. Thank you for that.

Q. Can you read Column 12, line 31 to 43 yourself and let me know when you're done.

A. Okay (Witness complies with request.)

Okay, I've read it.

Q. I'll represent to you that Column 12, line 31 to 43, are the only places in the '138 specification other than the claims that mention the words "virtual timeline." Your attorney can verify it at the break, but for now do you have any reason to disagree with it?

A. No.

Q. So Column 6A, lines 31 to 43, describes the virtual timeline in accordance with the present invention of the '138 patent. Agree?

A. Yes.

Q. Do figure 6A or Column 12, line 31 to 43, describe anything about a virtual timeline being requested by a client?

A. In this passage, no. This is just illustrating a schematic for the timeline, the virtual timeline.

Q. Do those portions of the patent describe anything about a virtual timeline being stored on a server?

A. No. Again, this is just describing the structure of a virtual -- of a sample virtual timeline.

Q. Do those portions of the patent describe anything about a virtual timeline being sent to the client from a server?

A. Not in this passage.

Q. Do you have any understanding as to what the enablement requirement is in patent law?

A. Yes.

Q. What is your understanding?

ATTORNEY WILSON: Objection. Calls for a legal conclusion.

THE WITNESS: Yeah, I don't know that I'm going to knock this one out of the park here, but generally that's the -- a specification has to disclose the invention in sufficient detail to enable the person of ordinary skill in the art to make an invention without undue experimentation.

BY ATTORNEY SHENG:

Q. Can you turn to claim 9 of the '138 patent.

A. Okay.

Q. Read claim 9 to yourself and let me know when you're done.

A. Okay. (Witness complies with request.)

Okay.

Q. Do you agree that claim 9 claims a web server configured to receive a virtual timeline from the user station?

A. No.

Q. How would you describe claim 9?

A. It's a web server configured to receive a virtual timeline request over an internet connection from one or more user and user station.

Q. Does figure 6A in Column 12, line 31 to 43 describe what's happening in claim 9?

A. No. But I think what's happening in claim 9 is incredibly straightforward for a person of ordinary skill in the art. I don't think they need any more explanation than the text in claim 9.

Q. You would agree that designing a streaming system where a playlist is sent between a

client and a server was well within the knowledge of a person with ordinary skill in the art at the time of filing. Do you agree?

ATTORNEY WILSON: Object to the form.

THE WITNESS: I don't understand. Your question isn't making sense to me, and it's not that what claim 9 is describing.

BY ATTORNEY SHENG:

Q. You would agree that claim 9 is incredibly straightforward for a person of ordinary skill in the art; correct?

A. Yes.

Q. You would agree that claim 9 doesn't need any more explanation from the text in claim 9. Agree?

A. In terms of being able to practice what's in claim 9, yes.

Q. My point is being able to practice what's in claim 9 is well within the knowledge of a person of ordinary skill in the art at the time of filing; correct?

ATTORNEY WILSON: Objection. Form.

THE WITNESS: Given the description here, a person of ordinary skill in the art would be able to practice claim 9 without undue experimentation.

BY ATTORNEY SHENG:

Q. A person of skill in the art would also know that you can design a streaming system where a client -- strike that.

A person of skill in the art would know that you can design a streaming system where a server requests a playlist; true?

ATTORNEY WILSON: Objection. Scope, form.

THE WITNESS: I don't understand what you're referring to.

BY ATTORNEY SHENG:

Q. Claim 9 recites a request for a playlist from a client to a server. Agree?

A. Agreed.

Q. And you testified that that design, where a streaming system has a client request a playlist from a server, was within the knowledge of a person of ordinary skill in the art; correct?

A. It's not that this was within the

content of this was within the knowledge. It's just that given the description here, a person of ordinary skill in the art, given their background, would be able to practice claim 9 without undue experimentation.

Q. Would a person of ordinary skill in the art, given their background, be able to practice a claim that was similar to claim 9 except where the request was sent from a server, the request for a playlist was sent from a server to the client?

ATTORNEY WILSON: Objection. Scope, form.

THE WITNESS: I don't understand that, the claim that you're reciting. I don't understand what streaming system that is.

BY ATTORNEY SHENG:

Q. A person of ordinary skill in the art would know how to design a streaming system where a client requests a playlist from a server. Can we agree on that?

ATTORNEY WILSON: Objection. Form, scope.

THE WITNESS: A person with

ordinary skill in the art would be able to, in particular, yes, practice the request that's described here in claim 9 without undue experimentation where a client requests a virtual timeline from a server.

BY ATTORNEY SHENG:

Q. And is the reverse also true, a person of skill in the art would know that you could design a streaming system where a server requests a playlist from the client?

ATTORNEY WILSON: Objection. Scope.

THE WITNESS: I don't recognize -- I can't conjure up a streaming system where a server is going to request a playlist from a client.

BY ATTORNEY SHENG:

Q. What about where a server requests a playlist from another server and sends it to the client.

ATTORNEY WILSON: Same objection.

THE WITNESS: Where a person of ordinary skill in the art would be able to practice a claim where the client

makes a request to a server. The server gets the -- the client makes a request for a virtual timeline of the web server. The web server retrieves the virtual timeline from another server and responds with that virtual timeline to the client. A person of ordinary skill in the art would be able to practice that.

BY ATTORNEY SHENG:

Q. Would you agree that a client requesting a playlist from a server or vice versa, a server requesting a playlist from a client or from another server, these are just design choices; fair?

ATTORNEY WILSON: Same objection.

THE WITNESS: No.

BY ATTORNEY SHENG:

Q. Handing you what's previously been marked as Exhibit 2011.

A. Okay.

Q. Do you recognize this document?

A. Yes.

Q. This is an internal Move document entitled "Overview of Move network streaming media technology." Agree?

A. That's what it's titled in. My understanding was it was an internal document.

Q. When was the last time you reviewed this document?

A. I believe I reviewed this document over the weekend.

Q. How many times did you review it cover-to-cover?

A. Over the weekend, just once.

Q. Do you see at the footer of page 1 that the document is dated April 7, 2004?

A. Yes.

Q. And the author of this document is Mark Hurst.

Do you see that?

A. I do.

Q. Who is Mark Hurst?

A. I believe he is also -- wasn't he --

Q. He's the inventor of the ABR patent.

A. I was going to say -- yeah, I was going to say I thought he was one of the inventors.

Q. On the very first page, the very first sentence under the introduction, it states, "The new streaming media technology invented by Move Networks is comprised of several innovative

techniques."

Do you see that?

A. I do.

Q. The last sentence of that paragraph states, "The technology we have invented is named Quantum Streaming."

Do you see that?

A. I do.

Q. Do you understand that the streaming media technology invented by Move Networks was once referred to as quantum streaming?

A. Generally, yes.

Q. The first sentence of the next paragraph states, "This document attempts to present in basic terms the innovations in quantum streaming."

Do you see that?

A. Yes. That's a fragmented sentence, but I see that.

Q. Do you understand that Exhibit 2011 is a Move document that explains the innovations of Move Network's streaming media technology? Do we agree on that?

A. I would agree that's what it's attempting to do.

Q. And you understand that Move Network implemented its streaming media technology into what it called the Move player; is that correct?

A. That is my understanding.

Q. When was the Move player publicly available, do you know?

A. Publicly available, I don't recall exactly. I think 2005, maybe, or I think it had been demonstrated to the public, I think, around 2005, but I don't recall the exact date.

Q. If you look at the last paragraph of page 2.

A. Okay.

Q. Look at the first sentence, I'll read that sentence into the record.

"Splitting files, data objects, merchandise, or information into pieces of various sizes for transport over networks is a fundamental and well-known concept in all areas of life."

Do you see that?

A. I see that.

Q. Do you agree with Mr. Hurst that in 2004, splitting files, data objects, and merchandise or information into pieces of various sizes for transport over networks is a fundamental

and well-known concept in all areas of life?

A. Well, I honestly don't know what he's referring to when he says "merchandise." But when I read this, if I understand him, for example, to be talking about the fact that when you transfer files or other data objects over network, they have to be segmented into network packets, which are fairly small pieces of information. Then with that understanding, I get what he's saying and I agree with it.

Q. Please turn to page 6. There's a heading there titled "Quantum Streaming Transport Solutions."

Do you see that?

A. I see that.

Q. Can you read the first paragraph under that heading to yourself and let me know when you're done.

A. Okay.

Q. Begins with "With a single innovation."

A. Thank you. (Witness complies with request.)

Okay. I've read it.

Q. Focusing on the second sentence, do

you agree with Mr. Hurst that the secret of Move media streaming technology relies on its use of multiple TCP connections between the client and the origin web server or web cache?

A. I believe that was his opinion. I don't know that I would say that was a secret.

Q. What do you mean?

A. What he's describing here is the use of what are called parallel connections to a web server and that's a -- that was a known technique.

Q. So you're disagreeing with what the inventor thought was the secret of his invention?

A. No. I think -- so he's not describing the invention here per se. He's describing their quantum streaming service. And I think what he's saying is that here is something we do that, you know -- I guess they hadn't told anybody. So this was their secret, and his belief is that the use of parallel connections, you know, improves performance, and they derive benefit from that.

Q. So you disagree with Mr. Hurst that the use of multiple TCP connections between the client and the origin web server was a secret back in 2004?

A. As a generic technique, it's not a secret. I think what he's saying is that the secret to their performance is this use of the technique.

Q. Let me ask a better question.

Do you agree that it was known in 2004 or at least by 2004 that you could use multiple TCP connections between the client and the origin web server in a streaming system?

A. I don't know about in a streaming, I don't know of any example of that in a streaming -- in a streaming context.

Q. Then why do you disagree with Mr. Hurst that the secret lies in Move's use in multiple TCP connections between the client and the origin web server?

A. This is his opinion; right. So he's free to say this is what his view of the secret is. I mean, when I read this as I guess someone who is more -- someone who has more than ordinary skill in the art, I think, you know, sure.

It's not -- doesn't seem -- to me, it doesn't seem like a big point, but for him, I mean, this was -- this was what he considered the secret or a secret.

Q. We can agree that the inventor thought that this was a secret, that the secret of their technology lies in the use of multiple TCP connections between the client and the origin web server?

ATTORNEY PAQUETTE: Object to the form, scope.

THE WITNESS: As I say, I don't know. I don't believe I've ever seen this in a streaming context, and it's because you can't do it in a traditional streaming context. But this is one of the many desirable properties that derives from the fact that they have streamlets is they can take advantage of parallel TCP connections. So with traditional streaming, you couldn't do something like this.

BY ATTORNEY SHENG:

Q. Do you agree that there are portions of Exhibit 2011 that you disagree with?

A. No, I don't disagree with anything that's in here. I'm just -- I was just bemused by their characterization.

Q. Can we agree that their

characterizations in Exhibit 2011 that you don't agree with?

A. No. I don't disagree with anything in here, characterizations or not. I just thought it was curious that that's what he was saying their secret was.

Q. You don't believe it's a secret; correct?

ATTORNEY WILSON: Object to the form.

THE WITNESS: There's difference between something that's novel and something that's secret. I think their use of multiple TCP connections was novel, in particular in a streaming context. Because the way streaming had been done up to this point, it was not possible to use multiple TCP connections.

So something that follows from their design is the advantage that they can use these multiple TCP connections, and it's going to be a huge win for them. I just -- as I say, I was just bemused that he referred to this as a secret.

BY ATTORNEY SHENG:

Q. Can you explain to me in layman's terms why using multiple TCP connections would be beneficial to a streaming system.

A. So it won't work with any old streaming system. You can't do it with streaming systems as I know it -- I'm not aware of anybody doing this prior to what Move Networks did.

But because of the fact that Move segments, they have multiple copies of the video, the videos are segmented, there's multiple encodings, they can distribute the multiple encodings across multiple web servers. They can pull multiple streamlets in parallel from multiple servers. So therefore, they can effectively then get more bandwidth out of the CDM than you can get with a single connection.

So they can get more content faster, which then presumably means that they can also get higher quality content. And they can only do this because of the fact that they have -- that they partition streams in the streamlets and have multiple encodings and distribute them among servers in the CDM.

Q. And in your view, you wouldn't consider this a secret to Move streaming

technology. Agree?

A. I would -- the only thing that I was expressing bemusement about was just the mere fact that they were using multiple TCP connections, nothing more. Everything else that I said that they did is all pretty amazing.

Q. Would you agree that the use of multiple TCP connections was an important aspect of Move's streaming technology?

A. I don't know if it was important or not. It certainly is a great thing for them to do. I mean, the system will work without the use of multiple TCP connections. It's going to work a whole lot better by using multiple TCP connections.

Q. Would the Move player have been as successful as it was in -- strike that.

Would the Move player have been as successful as it was without the use of multiple TCP connections?

ATTORNEY WILSON: Objection. Form.

THE WITNESS: I don't know. I haven't considered that.

BY ATTORNEY SHENG:

Q. Can you go to page 7 of

Exhibit 2011.

A. Okay.

Q. Do you see where it says in the first full paragraph, "By making individual requests"?

A. I see that.

Q. Can you read that paragraph to yourself and let me know when you're done.

A. Sure. (Witness complies with request.)

I've read that.

Q. Virtue pipelining is the technique of making multiple requests on the same TCP connection; correct?

A. No.

Q. How would you correct that statement?

A. The virtual pipelining is occurring because you are using multiple parallel connections.

Q. So virtual pipelining is the technique of making multiple requests over multiple parallel TCP connections; correct?

A. Let me just read this again.

Yeah. What he's calling virtual pipelining

is what results from their use of parallel connections to request streamlets.

Q. The idea being if one connection fails, then the other connections remain open and don't lose everything?

A. No.

ATTORNEY WILSON: Object to the form.

THE WITNESS: No.

BY ATTORNEY SHENG:

Q. How would you correct that?

A. That's not what virtual pipelining is. That's a true statement and that's called tolerance, but that's not pipelining.

Q. Could you explain to me in layman's terms what virtual pipelining is?

A. Pipelining is a form of realizing parallelism where you can have two operations going on in parallel. So, for example, when one streamlet with data for one streamlet is transiting from server to the player, a request can be transiting from the player to the same or a different server.

And by doing that, the latency for the request is masked by the latency for the return.

So you get the request for free in terms of time.

So pipelining means you got multiple things in stages, one going after another. So you've got requests and responses being transmitted at the same time.

Q. Let's stay on page 7 and look at the first paragraph under "client side streaming control logic."

Do you see that?

A. Sure.

Q. I'll read the first sentence into the record.

"A key and far-reaching conceptual and practical innovation of quantum streaming is the elimination of the need for specialized media services."

Do you see that?

A. I do.

Q. Do you agree with Mr. Hurst that a key and far-reaching innovation of Move's media streaming technology, is the elimination of the need for specialized media services?

A. Yes.

ATTORNEY WILSON: Object to the form.

Q. Instead of using specialized media servers, Move streaming technology used ordinary servers; is that correct?

A. Yes -- and this is part of what impressed me initially when I saw DASH and when I later saw that the Dish patents, the ABR patents were effectively, had invented what was done in DASH.

Q. Do you agree with me that the elimination of the need for specialized media servers was an important aspect of Move's streaming technology?

ATTORNEY WILSON: Object to the form.

THE WITNESS: In terms of -- what this does for you is it makes it cheaper to use and it gives you inexpensive scalability. So for, you know, an individual player, you know, you would never know that this is -- that this is happening, but in terms of having this thing be successful in the marketplace, yes, I would say yes, this is an important aspect.

BY ATTORNEY SHENG:

Q. Would you consider it a critical aspect?

ATTORNEY WILSON: Objection. Form.

ATTORNEY SHENG: What's the objection, Counsel?

ATTORNEY WILSON: The term "critical."

ATTORNEY SHENG: I'm asking him a question, was it a critical aspect.

BY ATTORNEY SHENG:

Q. Doctor, you can go ahead and answer.

A. If you're asking me is this a critical aspect, I don't know how to really assess critical. What I would say is -- you know, what you're asking me is if they didn't use vanilla web servers and instead they used specialized media servers, would the invention have been successful.

And that's incredibly difficult to answer because now I have to go and contemplate, well, what would their solution look like had they used specialized media servers that they, in fact, didn't use.

So it's difficult to speculate on how

critical or not this is, because we don't really know what the alternative was.

Q. If you go to -- let's go back to Exhibit 2006.

A. Okay.

Q. 185.

A. 185. I'm there.

Q. Paragraph 185, the very last sentence you quote an exhibit where it appears someone expressed shock at how crisp and clear he was able to stream the show Lost using Move's technology. Is that fair?

A. Yes.

Q. This person expressed that the full screening HD quality was shockingly good; correct?

A. Yes.

Q. "It was crisp, clear glory."

Do you see that?

A. I see that.

Q. Do you have the Dish POR in front of you? I don't think I marked it.

A. No, I have Exhibit 9.

Q. You have Exhibit 9?

A. It says "Patent owner's response."

Q. Very good. Exhibit 9, if you go to

page 2 of Dish's POR.

A. Page 2.

Q. There's three images on page 2.

A. Yes, I see that.

Q. The user watched a show that looked like the low quality image during the entirety of the show. Fair to say the user would not be impressed by the show's crisp, clear glory?

ATTORNEY WILSON: Objection to form.

THE WITNESS: Sorry, I'm not sure what you're asking me. These are individual still images.

BY ATTORNEY SHENG:

Q. Sure. If a user watched a show that looked the low quality image shown on page 2, you would agree with me that the user would not express satisfaction with the viewing experience. Agree?

ATTORNEY WILSON: Same objection.

THE WITNESS: So let me make sure I understand the question. You're saying the user was watching a video program and that video program for that user was only sustainable using a quality encoding that's equivalent to what's shown here as

low quality and that's how they were -- they can only sustain that quality for the duration of the program, would the user -- would that user say that that was shockingly good? Is that more or less -- no, they probably wouldn't.

BY ATTORNEY SHENG:

Q. They would be dissatisfied; correct?

A. I don't think they would be dissatisfied. I mean, this is kind of the way a lot of streaming worked at the time.

Q. They certainly wouldn't be impressed by the show's full screen HD quality; correct?

A. They would not say this is HD quality, and it's probably because, you know, given where they were in their network setup, according to the premise of the question, they're just not able to sustain HD quality. But they would still be able to watch it, and they would be able to hear the audio and see the motion. They just wouldn't have the greatest picture.

Q. And if the user watched a show that quality started at the low-quality version and switched up to the high-quality version, let's say a couple minutes, and then switched back to the

low-quality version for the remainder of the show, you would agree the user would not be impressed by the show's full screen HD quality?

ATTORNEY WILSON: Objection. Form.

THE WITNESS: What I would say is in the time frame which this comment was made, first and foremost, the user would be amazed that they can still watch the full show. That the system was able to adapt without the system freezing or rebufferring. The quality would fluctuate and the quality would be poor, but that's only because of the network connectivity.

So I think to put ourselves back in the time frame that we're talking about here, they would be impressed that they could see the whole show. They -- for the portions where they didn't have sufficient connectivity for the high quality, they probably would say that part wasn't -- wasn't shockingly good. But for the portions where they can see in high quality they can say that was

great, and in general I think they would be happy that they can see the entire show, because that's something that they couldn't do with other technology that existed at the time.

BY ATTORNEY SHENG:

Q. You would agree with me that if a show consistently switched between the low-quality version and the high-quality version, the user would not be impressed by the show's full screen HD quality; correct?

ATTORNEY WILSON: Objection. Form.

THE WITNESS: I think at the time frame that we're talking about here, they would be impressed that they could watch the entire show. That's first and foremost and I think that would truly be impressive. They would not say the quality was shockingly good throughout, but I think they would be impressed that the show never stopped, they could watch the full episode and that there were full periods that were of high quality.

BY ATTORNEY SHENG:

Q. Would you agree with me that if the user switched -- strike that.

Would you agree with me that, if the video switched between the medium quality and a low-quality version skillful without the video that the user would not be impressed by the show's full screen HD quality?

ATTORNEY WILSON: Objection to form.

THE WITNESS: Who knows. They could be because no one else was really doing HD at this time, in particular, for feature length programming. So the fact that you can see anything in HD for the entire length of the program is pretty cool.

BY ATTORNEY SHENG:

Q. Is the medium quality image on page 2 reflecting HD quality?

A. I don't know.

Q. You can see it, though; right?

A. I can see the image. You know, I don't know what was the function of the printer here. I mean, it's not as good as the high

quality. But remember, people during this time frame, they had nothing to compare it to in terms of streaming. So this was far better than anything else you could do streaming, and medium quality is not that bad.

Q. Handing you an exhibit, a document previously marked as Exhibit 2059. And this is a Move document titled "The next generating video publishing system"; correct?

A. Yes.

Q. When was the last time you reviewed this document?

A. Over the weekend.

Q. How many times did you review it cover-to-cover?

A. I've looked at this one several times in the last several days, but I think over the weekend I just -- cover-to-cover I think just once.

Q. If you look at the footer on page 2, do you see that the document is dated April 11, 2007?

A. Yes.

Q. The document appears to be some sort of internal white paper. Do you know what this

document was used for?

A. I don't know that this is -- it's certainly a document that's marked Confidential. I didn't get the sense reading this that this was an internal document. I got the sense this is something they would share with their customers.

Q. Can we agree that this is a document that describes Move's streaming technology?

A. Yes. It provides an overview of it.

Q. Can you go to page 10 of Exhibit 2059.

A. Sure.

Q. There is a --

ATTORNEY WILSON: Hold on.

THE WITNESS: 10, got it.

BY ATTORNEY SHENG:

Q. There's a section titled "Transmission Advantages."

Do you see that?

A. Yes.

Q. Please go ahead and skim the first paragraph. My question is simply going to be whether paragraph 1 is describing general problems related to internet network congestion. Go ahead and read it, and then when you're done I'll ask

that question.

A. Great. Thank you for that.

(Witness complies with request.)

Okay. I've read it.

Q. The first paragraph under the section titled "Transmission Advantages" describes general problems related to internet network congestion; correct?

A. Yes. And describes two problems specifically.

Q. And then if you can skim paragraph 2, my question is simply going to be whether paragraph 2 is describing general background related to the TCP protocol.

Go ahead and read it, and then I'll ask the question.

A. (Witness complies with request.)

Yes. I've read it.

Q. Let's go to the next paragraph, which is the first paragraph on page 11. And this is the paragraph that I want to focus on.

A. Okay.

Q. The first sentence says, "TCP-based media servers typically rely on RTP/RTSP to control video flow."

Do you see that?

A. I do.

Q. The document is discussing or -- strike that.

This paragraph is discussing TCP-based media servers that relied on RTP/RTSP to control video flow; correct?

A. Yes.

Q. RTP/RTSP have a protocol used by Real Network's video streaming player; correct?

A. Among others. And these are two separate protocols that get used together.

Q. Very good. In your career, you've worked on TCP-based media servers that relied on both RTP and RTSP to control video flow; correct?

A. The RTP work that I did was RTP over UDP, as best I recall. And I don't recall for RTSP whether we were using the word TCP or UDP.

Q. But you've worked on TCP-based media servers -- strike that.

Sitting here today, you don't recall working on TCP-based media servers that relied on RTP/RTSP?

A. If you're talking about the work in my research for the systems we were building, all

of our work was -- we did use RTP, and I think we had one RTSP implementation, but the work we were doing at UNC, it was all based on UDP, primarily because of the issues that this document is laying out that you have with TCP.

Q. The second sentence of that paragraph we're looking at states, "The streams served get stuck because the protocol is not responsive enough to keep interface with common internet communication issues discussed above; i.e., packet locks, latency, and congestion."

Do you see that?

A. Yes.

Q. Is this a problem that was known prior to the Dish's ABR patents?

A. Yes, and this is part of the reason why I said when I first encountered this stuff, first in the form of DASH and then in ABR patents I was so impressed that they were making it work over HTTP and TCP.

Q. And the next few sentences read, "During video streaming the client is constantly communicating the status and health of the communication link. The client will forward specifics on such things and packet locks and

latency."

Do you see that?

A. I do.

Q. Is Move's description here consistent with your understanding of how streaming systems operated prior to Dish's ABR patents?

A. Every system was unique. I mean, they all operated differently. So I would say -- I understand what they're describing here, but I can't represent that this is what all systems were doing.

Q. So the next sentence says, "With this information, the media server makes decisions concerning whether to throttle the bit rate up, down or drop into emergency slide show mode."

Do you see that?

A. Yes.

Q. Prior to Move's streaming technology, it was known in the art that TCP-based media servers relying on RTP/RTSP to go into emergency slide show mode; correct?

ATTORNEY WILSON: Objection. Form.

THE WITNESS: I got lost from -- let me just read this whole paragraph. I

got lost in the middle.

Okay. Sorry. Can you ask your question again.

BY ATTORNEY SHENG:

Q. Prior to Move's streaming technology, it was known in the art that TCP-based media servers relying on RTP/RTSP to go into an emergency slide show mode; correct?

ATTORNEY WILSON: Same objection.

THE WITNESS: I don't know that as a factual matter. I'm not aware of -- I can't think of a -- I don't know if I've ever seen an RTP/RTSP server drop into emergency slide show mode. Maybe they did it. I'm just not aware one way or another.

BY ATTORNEY SHENG:

Q. Can you turn to page 17 of Exhibit 2059.

A. Okay.

Q. Do you recall reviewing page 17 which says "Appendix A" when you reviewed this document in preparation for this deposition?

A. Yes.

Q. What is your understanding of what

Exhibit A is showing?

A. It's just trying to find some data on their -- they've done some experiments with different protocols, different combinations of protocols, and the levels of performance that they get when they simulate network congestion.

Q. Do you see where page 17 lists Vividas, V-i-v-i-d-a-s, Apple QuickTime trailers, CBS News? Do you see those?

A. I do.

Q. Are those videos that were streamed as part of Move's tests?

A. As I understood this, this is either -- it's a combination of -- it's the content that they're using and where it came from and some facts about the bit rate. So this is the context that they were experimenting with.

Q. Okay. So Vividas, Apple QuickTime trailer, CBS News, these were contents that they were using for their tests; correct?

A. Yes.

Q. And on page 17, there's a table. Do you see that?

A. Yes.

Q. And what is this table showing?

A. Well, so this is their sort of experimental results, the effective bit rate that they got as a function of the maximum -- the maximum streaming rate that they could have sustained.

Q. Let me go back up for a second. Do you see where under -- it says for RTP or RTSP delivery, video.MSN.com at 220 kilobits --

A. I'm not following. Okay. I see it. Sorry.

Q. So you agree that video.MSN.com is content that they used as part of these tests. Agree?

A. That's part of the content that they seem to say they used.

Q. And next to the video.MSN.com it says, "220-kilobit per second encodes."

What does that mean?

A. I think that is the rate at which data was coming out of the codec.

Q. The video was encoded at 220 kilobits per second; is that right?

A. I think that's the way to interpret it.

Q. Okay. And going back to the table,

there's an asterisk at the bottom of the table that says, "On several of the test runs, the protocol went to 80 kilobits for second slide show mode."

Do you see that?

A. I do.

Q. What's your understanding of that?

A. I don't really know what exactly they mean from here. What I take away from this is that essentially the stream or the player was no longer showing video and was just showing still images.

Q. You would agree that when the system went into slide show mode, it was still showing the video from video.MSN.com; correct?

ATTORNEY WILSON: Objection. Form.

THE WITNESS: I don't know that.

BY ATTORNEY SHENG:

Q. Is it your testimony today that when Move performed these tests, that when the system went into slide show mode, it showed totally different video?

ATTORNEY WILSON: Objection. Form.

THE WITNESS: They're not

explaining exactly what they saw. So I do not know as a factual matter what was actually being displayed when they ran these tests and found that they went into slide show mode.

BY ATTORNEY SHENG:

Q. Is it your understanding -- strike that.

For RTP and RTSP delivery, Appendix A only lists video MSM.com; correct?

A. I don't understand the question.

Q. What are the sources of content provided -- strike that.

Video.MSN.com is the only source of content listed in Appendix A for RTP and RTSP delivery; is that correct?

A. Oh, I see where you're reading. I'm sorry, I wasn't following you.

For RTP or RTSP, yes, it's just that one source.

Q. And it's your testimony today that when the system conducting the RTP or RTSP delivery test, when the system went into slide show mode, you can't tell me, sitting here today, that it's still showing the video from video.MSM.com?

ATTORNEY WILSON: Objection. Form.

THE WITNESS: I think the implication is it's still showing images from the video.MSN.com. But that's just an inference I'm making. The document doesn't describe their tests in any more detail than what's here.

BY ATTORNEY SHENG:

Q. Do you agree that the -- strike that.

You testified that the implication is that it's still showing -- that it's showing image stills from the video in video.msn.com; is that correct?

A. That's how -- that's just how slide show mode connotes to me.

Q. Did the Move player include an emergency mode, do you know?

A. I can't remember if it's in this document or one of their other documents. I think it's a different -- there is a Move document where I think they reference an emergency mode.

Q. What's your understanding of the emergency mode in the Move player?

A. I think it's essentially that it just shows a still image or possibly what they call a slide show.

Q. Handing you what's previously been marked as Exhibit 2012. And Exhibit 2012 is a Move document entitled "Technical overview of Move network implementation"; correct?

A. Yes.

Q. Is this the document you were referring to that possibly discussed the Move player's emergency mode?

A. Yes.

Q. Is it your understanding that when the Move player went into emergency mode, that the still images -- strike that.

Previously I asked you what's your understanding of the emergency mode in the Move player, and you answered, "I think it's essentially that it just shows a still image or possibly what they call a slide show."

Do you remember that?

A. Yes.

Q. So just to make sure I understand, a user is watching a video, let's say a car race on the Move player and the Move player enters

emergency mode. The user would be shown still images or a slide show of the same car race. Agree?

A. No. I think looking at this now is refreshing my memory. I think their notion of emergency, their so-called emergency profile is much more generous. So it's just really low bit rates, low resolution video at a path -- depending on whether you're talking about, you know, NTSC or 16-by-9 or four-by-three, it's degraded, degraded video, but it's still video.

Q. Okay. So in the Move player, let's say a user is watching a car race, and the Move player enters emergency mode. Strike that. I lost the real time. Okay. I got it back.

So in the Move player, let's say a user is watching a car race and the Move player entered emergency mode. You would agree that the user would be presented a really low bit rate, low resolution video of the car race?

A. It depends on which version we're talking about. I mean, it defines it differently for the different aspect ratios, but compared to their, you know, their high bandwidth in encoding, what the emergency mode is is a very low, low

resolution, low bit rate, lower motion stream.

Q. So the answer is yes?

A. What was the original question?

Q. In the Move player, let's say a user is watching a car race and the Move player entered emergency mode, you would agree that the user would be presented a really low bit rate or a lower bit rate motion version of the car race?

A. Well, so the reason I gave the answer I did is I don't want that answer taken out of context. It's low compared to their high bit rates. But it's still a -- it's still crunching a substantial amount of data. It's significantly lower, lower resolution, lower frame size and frame rate than their highest.

Q. Let's turn to page 19 of Exhibit 2012.

A. Okay, I'm there.

Q. There's a heading titled Encoding Media Profiles Move SimulCode.

Do you see that?

A. I do.

Q. The first sentence under the heading states "Move networks and codes to either high definition 16-by-9 or standard definition 3-by-4

aspect ratios using one of the following best practice profile sets based on aspect ratio 16-by-9 in frames per second."

Do you see that?

A. I do.

Q. And then it says, "Profiles up to 2.4 megabits per second when using video streams intended for distribution over high bandwidth network."

Do you see that?

A. I do.

Q. 2.4 megabits per second is 2.4 megabits per second. Do you agree?

A. Roughly.

Q. At the time of this document, Move considered a network capable of streaming at roughly 2400 kilobits per second for a high bandwidth network; correct?

A. They considered a -- I don't think it says anything about high bandwidth networks. I mean, I think what it's saying is if you are on a network that is high bandwidth, you can get codings and codings up to 2.4 megabits, or if you want to do it in kilobits, what you're calling 2400 kilobits.

Q. In the next paragraph of Exhibit 2012, it discusses low-end profiles.

Do you see that?

A. I do.

Q. Low-end profiles included thumbnail profiles.

Do you see that?

A. I do.

Q. What is your understanding of Move player's thumbnail profile?

A. I just understand it by how it's described in the tables corresponding to the 16-by-9 of the 4.3 -- 4-by-3.

Q. Do you see in the second paragraph thumbnail profile is referred to as stream type equals T as in Tom?

A. Yes.

Q. And if you look at the table on page 19, do you see that stream type T has a total rate of 32 kilobits per second and 12 frames per second; correct?

A. Yes.

Q. Stream type T is at the top of the table?

A. Yes.

Q. And it has the lowest total rate and the lowest frame per second of those profiles; correct?

A. Correct.

Q. At the bottom of the table, there's a profile having a total rate of 2400 kilobits per second or 30 frames per second.

Do you see that?

A. I do.

Q. And that's a high bandwidth or higher bandwidth profile. Agree?

A. I agree.

Q. Do you agree that the low-end thumbnail profile is a lower quality version of the same video as the high bandwidth profile?

A. Yes.

Q. It's the same video, but encoded at a lower total rate, lower frames per second. Agree?

A. And lower resolution.

Q. And so let's go back to the second paragraph under the section we've been looking at, focusing still on the first sentence of that paragraph. Do you see that the Move player had another low-end profile called the emergency

profile?

A. Yes.

Q. Do you see the emergency profile mode is stream type equals E?

A. Yes.

Q. And if you go to the table at the bottom of page 19, stream type E has a total rate of 150 kilobits per second at 15 frames per second.

Do you see that?

A. I do.

Q. Do you agree that the low-end emergency profile is a lower quality version of the same video as the high bandwidth profile?

ATTORNEY WILSON: Objection. Form.

THE WITNESS: It's a lower quality and coding of, for all the -- it's a lower in quality encoding than the higher, than say the 2.4 megabits encoding.

ATTORNEY SHENG: Let's go off the record for a minute.

THE VIDEOGRAPHER: The time is 3:56 p.m. We're going off the record.

(Discussion held off the

record.)

(Recess taken from 3:54 p.m. to 4:09 p.m.)

THE VIDEOGRAPHER: Time is 4:12 p.m. We're now on the record.

BY ATTORNEY SHENG:

Q. Doctor, did you speak to anybody during the last break about your deposition?

A. Not about the deposition.

ATTORNEY SHENG: Pass the witness.

ATTORNEY WILSON: Ask for -- sorry to do this, but another five-minute break.

ATTORNEY SHENG: Just remind you, Doctor, you're not allowed to speak to your attorneys, okay.

THE WITNESS: Okay.

ATTORNEY WILLIAMS: I don't think that's true. We'll talk to the Court about that.

ATTORNEY SHENG: Speak to the attorneys about the substance of your deposition. Happy to have you call.Who is speaking?

ATTORNEY WILLIAMS: Sorry, this is

Elliot Williams.

(Discussion held off the record.)

THE VIDEOGRAPHER: It's almost 4:13 p.m. We're now off the record.

(Recess taken from 4:13 p.m. to 4:27 p.m.)

THE VIDEOGRAPHER: Time is 4:29 p.m. We are now on the record.

EXAMINATION BY

ATTORNEY WILSON:

Q. Dr. Jaffay, do you recall earlier today you were asked about the standard of unpatentability that you applied in your patent in the response declaration which was marked Exhibit 2006?

A. Yes.

Q. And what standard did you apply for purposes of your patent declaration?

A. That validity has to be shown by a preponderance of the evidence.

Q. Do you recall you were also asked about the standard you applied in your preliminary response declaration which was marked Exhibit 2001?

A. I think I was asked about the

standard that was stated in the preliminary response, and that is the declaration in support of the preliminary response.

Q. Correct. Do you recall that?

A. Yes.

Q. Would any of your opinions change -- strike that.

Would any of your opinions in the preliminary response declaration, Exhibit 2001, change under the preponderance of the evidence standard that you applied in the POR?

ATTORNEY SHENG: Objection. Leading.

THE WITNESS: I don't think so.

ATTORNEY WILSON: Pass the witness. I've got nothing.

THE VIDEOGRAPHER: Counsel, does this conclude today's deposition?

ATTORNEY WILSON: Yes.

ATTORNEY SHENG: Yes.

THE VIDEOGRAPHER: This concludes today's deposition, the date being October 1, 2024. The time is 4:31 p.m. We're now off the record.

THE COURT REPORTER: Would you

like to state your transcript order on the record now.

ATTORNEY SHENG: Like what's the fastest we can get it?

THE COURT REPORTER: Two days.

(Discussion held off the record.)

ATTORNEY PAQUETTE: Standard delivery.

ATTORNEY SHENG: If we can get the rough version as soon as possible. And then the final as fast as you can do it, that would be perfect.

ATTORNEY WILSON: We do want a rough. No rush.

ATTORNEY LYNN: He'll review and sign for us.

(Proceedings adjourned at 4:31 p.m.)_

DISTRICT OF COLUMBIA: SS

I, Barbara Moore, a Registered Court Reporter of the District of Columbia, do hereby certify that these proceedings took place before me at the time and place herein set out, and the proceedings were recorded stenographically by me and this transcript is a true record of the proceedings.

I further certify that I am not of counsel to any of the parties, nor an employee of counsel nor related to any of the parties, nor in any way interested in the outcome of this action.

_____

BARBARA MOORE, CRR, RMR

_____

My Commission Expires:

September 30, 2028

ERRATA SHEET

I wish to make the following changes, for the following reasons:

Page	Line		
____	____	CHANGE	_____
		REASON	_____
____	____	CHANGE	_____
		REASON	_____
____	____	CHANGE	_____
		REASON	_____
____	____	CHANGE	_____
		REASON	_____
____	____	CHANGE	_____
		REASON	_____
____	____	CHANGE	_____
		REASON	_____
____	____	CHANGE	_____
		REASON	_____
____	____	CHANGE	_____
		REASON	_____

_____

DR. KEVIN JAFFAY

Sworn to before me

this ____ day of _____, 2024.

_____

Notary Public

A

a.m 1:22 4:3 59:3,5,5,6 145:10,14
abiding 31:5
able 21:23 70:5 87:13 93:14 94:5 104:19 110:2 118:8 120:1 121:17 122:21 123:3 184:25 206:13 208:21 243:3 250:21 254:18,20 255:3 256:4,7 257:1,24 258:8 274:11 276:18,19 276:19 277:10
above-en... 1:18
ABR 9:3,8,10 9:13,20 17:14,17 18:1 21:11 27:5,14 46:10,25 47:1 49:8 49:14,24 50:3,16 56:13 65:19,20 97:12 120:2 150:14,22 153:15,19 154:11 163:1,2,8 163:12,17 164:7,20 166:13 167:3,7 225:8,24 226:8 230:24 231:3 259:19 272:6 284:15,18 285:6
absolutely 29:1 87:5 125:4
abstract 36:7,8,15 36:19 37:3 196:19,23 198:14
academic 35:15 48:10,25 60:15
accept 61:22 207:3
accepted 7:15
access 35:16 132:4,7 203:8,9
accurate 7:6 104:16 156:25 249:7
accurately 23:10
achieved 197:9
acknowle... 80:18
acquired 60:7 66:17 107:2 151:19,21 151:24,25
acronyms 250:25
act 205:6
acting 210:20,20 210:21
action 4:7 11:4,6 14:9,13,21 14:23,24 15:2 303:12
actors 210:19,21
actual 62:11
adapt 74:24 75:10,23 105:18 106:8 277:11
adaptation 53:24 54:12 55:5 68:10,10 70:20 71:20,20 75:19 104:24 105:21,23 106:12,21 106:24 107:1,4,13 107:17,22 130:12,18 130:22 142:1 143:1 144:17
adaptations 110:25 111:2
adapted 122:4
adapting 106:25 107:5,7,7 108:25 109:3,3,5 149:6
adaptive 50:20 66:25 67:22 68:6 68:9,13,21 69:15,22 69:23 70:1 70:8,13,16 70:19,23 71:3,7,11 71:16,22 71:24 72:13 74:7 74:14 101:18 102:4 104:12,20 104:25 107:10 108:6 110:3,19 111:13,18 128:24 129:3,10 134:16,22 141:20,23 141:24 142:16,21 142:24 143:16 144:12,20 150:9
adaptively 149:24
add 144:10 241:8
adding 144:10 209:21
addition 153:12 224:19
additional 224:16
addresses 212:10
adjourned 302:18
adjust 130:24 131:10 134:18 142:1,17 142:23
adjusted 122:3 131:9,12
adjusting 131:7,7,21
adjustments 121:3,8,13 121:19 122:2,16 124:16,19 125:11 129:5,12 129:15,16 129:24 130:1
adjusts 131:2 135:8
administ... 4:19
adopt 100:20
advantage 121:1 122:14 123:8,23 123:25 265:15 266:20
Advantages 281:18 282:6
agent 217:20 217:25,25 218:4,7,16 218:19,22 219:10,14 219:22 220:2
aggregation 132:12 133:5,9,19
ago 22:2 79:11 108:10 116:11,13 164:19 223:23
agree 6:9,25 7:18 8:13 9:11,14,17 9:23 18:1 23:9 25:7

28:16
39:20
41:15 44:4
45:3,13
46:17
53:14
61:16 62:2
65:7 70:22
71:23
74:23 79:7
81:17
83:11 84:3
88:14,18
89:3,22
90:6 91:19
92:14
95:10
96:13,17
101:23,24
102:22
109:4,22
110:12
112:22
114:1
115:8
116:12
117:24
118:14
119:10
126:22
127:2,13
128:20
132:21
133:2,6
140:7,25
142:8
143:3
147:20
148:22
151:16,21
152:3,24
155:22
157:14,16
157:20
158:2
160:3,23
161:21
165:3,21
166:3,12
166:15
167:3,14
168:11
169:3,24
170:2,14
170:17
171:11,19
171:24
172:12,18
173:16,19
174:8,20
175:18
176:15
178:6,10
178:14,17
179:10
181:2
182:19
183:13,19
185:13
186:5,8,9
187:8,16
187:21
189:3,15
189:23
190:9,22
191:8,24
192:6,9,24
193:2,12
194:23
196:8
198:17
199:1,5,16
199:20,22
200:21
201:25
202:21
203:6
204:15,23
208:10,20
216:22
219:24
220:10
224:10,12
224:18,20
228:1,4,8
229:21,25
230:4,12
230:22,25
231:4
232:1,8,16
234:15
238:8
239:3,18
240:4,14
240:25
244:7
246:5,7,9
251:18
253:10,24
254:3,11
254:15,17
255:19
256:22
258:10,25
260:23,24
261:22
262:9
263:1
264:6
265:1,20
265:25
266:2
268:1,7
271:19
272:9
275:17,18
277:2
278:7
279:2,4
281:7
288:11,13
289:12
291:10
293:3,18
294:6
295:13
297:11,12
297:13,19
298:11
Agreed 193:8
217:21
255:20
agreeing
230:8
ahead 69:17
128:4
161:7
165:13
231:13
273:13
281:21,24
282:15
aims 239:9
Allen 238:1
238:7,11
238:13,16
238:19
239:9,14
239:15,19
239:21
240:2,12
240:20
241:4,11
243:12,15
243:16,21
243:24
Allen's
239:4,8
244:8
alleviated
132:4,7
allowed
102:13
158:23
299:15
allowing
33:7 86:8
86:24
allows 239:5
247:6,13
247:18
alternate
210:15
alternative
173:2,7
176:10
178:22,23
182:12
184:7,9
274:2
alternat...
166:25
167:9
197:5
alternat...
43:8,12
Alto 2:13
242:9
amazed 277:9
amazing
268:6
Amazon 77:19
77:25 78:2
78:5,9,15
79:13 84:9
84:15 85:1
85:10 86:2
87:8,15,22
88:5 90:14
93:7 94:7
ambiguous
40:1
ameliorate
136:8
amortize
237:18
amortizing
234:1
amount 14:6
149:23
294:13
amounts
185:12
analysis
37:15 81:7
86:1 87:15
88:5 94:25
156:12
and/or 50:23
Andrew 2:11
5:1 99:14
andrew.w...
2:14
Android
243:8
animated
172:10,16
172:20
174:24
175:6,8,19
176:11,12
187:14,20
animation
180:21
188:8,9
animations
180:22
answer 26:9
27:10 37:1
57:20

69:17 76:3
82:2 84:23
85:25
86:13,18
111:17
118:24,24
129:20
139:12
157:3
190:7,8,8
207:22
212:21
214:2
218:3
220:15
221:11
223:22
224:15
228:19
241:9
243:14
273:13,20
294:2,10
294:10
answered
34:25
82:18 95:5
292:18
answering
85:9
answers
96:18
118:22
anybody 59:9
145:19
198:10,12
211:8
263:18
267:7
299:7
apart 115:21
174:7
Apologies
165:23
APPEAL 1:1
appear 173:3
173:6,8,12
244:16
APPEARANCES
2:1
Appearing
2:5,9,15
2:19,20
appears 8:14
24:5 31:1
61:4 77:14
77:17
83:13
110:16
146:1
156:13
167:15
202:2
221:18
225:12
230:23
238:9
274:9
280:24
Appendix
286:22
290:9,15
Apple 287:8
287:18
applicant
25:6,25
applicants
80:11
application
24:19 25:9
25:17,22
26:3,4,5
26:11,21
26:23 27:7
27:9,15
32:2 33:2
105:20
108:21
117:6,18
118:4,7,13
118:17,25
119:2,15
119:20
120:6
126:10
applicat...
27:1
128:20
applied 24:1
28:10,16
29:4,11
68:6,21
300:14,23
301:11
apply 9:19
24:2 28:19
29:16
222:22
223:21
300:18
applying
38:4,7
appreciate
83:20
approach
35:11,22
approached
10:20
approaches
148:4,6
appropriate
93:13 94:4
150:24
appropri...
142:1,18
142:23
approxim...
5:16,19,23
6:19 17:9
182:11,21
183:3,9,15
183:21
approxim...
21:24
April 259:11
280:21
architec...
54:25
architec...
50:22 51:3
55:9,15,18
56:4 98:18
103:5
archived
222:4
areas 261:19
262:1
argue 62:9
78:6 84:9
84:15 86:4
86:20
146:17
225:1
249:2
argued 85:1
85:10
87:14
argument
40:20
160:19
161:8,12
161:17,19
161:22,23
162:6,7,12
173:1
Argument...
87:25
arrive 96:11
97:20 98:3
arriving
28:12
art 15:13
28:19,21
28:25 29:3
29:5 35:7
35:12,19
36:18,18
36:22
38:19 41:7
41:17
42:22 43:2
43:25 45:1
45:7 46:21
47:24 48:5
50:8 56:14
56:16
65:12,16
65:18,23
66:2 79:14
80:3,14
116:16
117:4,11
118:10
119:12
120:2
159:10,21
160:4
170:4
174:17
196:6
208:13,23
209:12,25
225:16,21
226:2,7
232:22
233:2,3,11
237:2
252:23
253:22
254:2,13
254:22
255:3,7,10
255:24
256:3,7,20
257:1,9,24
258:7
264:21
285:19
286:6
article 3:12
76:21,25
78:21 79:1
79:5,14
83:25 84:3
110:13,17
112:21
121:18
127:13
128:17
135:18
artifact
137:3
aside 58:12
99:11
160:9
asked 7:9
11:9,21
12:9 13:20
19:17 20:4
20:22 27:4
27:12,12
31:17
35:13 57:5
57:7 78:9
82:18 95:5
132:22
157:2,3
161:6
198:21
204:16

221:22
235:14
292:16
300:13,22
300:25
asking 12:22
70:1 115:4
116:15,17
164:23
185:9
206:19
207:11
218:12
235:21,23
273:10,14
273:17
275:12
aspect 152:8
158:16
184:5
238:25
268:8
272:11,24
273:3,11
273:15
293:23
295:1,2
aspects 48:8
73:9 239:3
asserted
50:8
assess 85:19
118:8
119:23
140:3
273:15
associated
218:1
assume 26:1
27:8 34:9
93:19
94:24
113:16
137:25
160:7
178:24
242:12
243:7
assumed
32:19
92:16 94:1
98:22 99:2
99:10
assuming
72:17
74:18
114:22
169:12
170:9,17
182:4,9
183:13,19
213:5
215:12
239:25
240:10,22
assumption
27:2,16
183:1,4,9
183:11,25
241:8
asterisk
144:24
289:1
attempt
23:12,17
75:10,23
106:4
129:4,11
attempting
108:5
202:10,11
260:25
attempts
260:14
attention
101:19
attorney 3:4
3:7 4:21
5:1,12 7:3
7:7 12:24
13:6,7,11
13:14,15
13:17
14:14,19
25:10,14
25:19 26:8
26:14,17
28:22 29:2
33:18,24
34:19,23
35:2,6
36:23 37:5
39:1,6
40:15,22
41:9,13
45:4,10,25
46:5,12,16
52:13 53:2
54:14,18
55:19 56:1
58:5,7,17
58:19,22
59:8 60:22
61:1,17,23
68:23 69:5
69:7,9,11
69:16
72:15,19
75:1,12
77:9,11,21
78:1 79:16
80:1 81:11
81:16,22
82:4,17,24
83:3,7,10
87:1,7,24
88:8 89:6
89:18,23
90:2,16,18
90:21 95:4
95:9,20
96:2 97:5
97:13
109:9,15
110:21
111:4
115:11,20
120:13,20
121:20
122:1,23
123:6
130:2,13
137:9,20
138:4,8,13
138:17
140:10
141:2,8,10
141:14
145:17,21
146:4,9
147:25
148:13
159:23
160:2
165:11
174:12,18
175:11,15
177:5
180:3,24
184:20
185:3
187:9
192:14
193:1
194:15,22
197:15,22
197:24
198:1,9
200:24
201:3,7,13
201:17
202:24
203:4,23
204:6
206:5,11
206:17,24
207:9,18
209:16,23
210:3,17
210:22
211:1
218:9,15
222:12,18
223:6,10
224:3,13
224:17
225:19
226:1,5,14
226:23
227:5
228:9,11
228:13,15
228:16,18
229:1,5,7
229:9,20
241:14,19
242:2,7,17
243:5
248:7,18
251:13
252:15
253:1
254:4,10
254:24
255:6,13
255:17
256:12,18
256:23
257:7,12
257:18,22
258:9,15
258:17
265:6,19
266:9
267:1
268:20,24
270:7,10
271:24
272:13
273:1,4,6
273:8,10
273:12
275:9,14
275:19
276:7
277:4
278:6,12
279:1,9,18
281:14,16
285:22
286:4,9,17
289:15,18
289:23
290:6
291:1,9
298:14,21
299:6,10
299:11,14
299:18,21
299:25
300:11
301:12,15
301:19,20
302:3,8,10
302:14,16
attorneys
12:25 13:2
57:5
299:16,22
attracted

101:19
102:3
attributes
112:3
129:5,12
129:15,25
attributing
85:15
audio 50:23
60:1,7
66:21 67:1
67:23
68:21
69:24
70:14,14
70:17,24
71:3,11,16
71:25 72:7
72:13
78:22 91:7
91:17
92:12,25
93:3,15
112:8,12
112:13,18
112:22,23
113:1,4,6
113:9,12
113:14
127:6,9,16
127:18,19
133:21,21
134:2,7,8
147:18
148:7,20
149:1,7
150:10
152:13,19
152:23
160:23
161:4,15
161:24
162:3,15
162:24,24
163:4,9,18
164:15,22
165:6
166:25,25
167:4,8,9
167:24
168:7
169:2,10
169:19,25
170:7,11
170:15
188:7,9
243:17
276:20
aughts 158:5
August 92:15
92:23
93:25
94:25
author 76:22
79:1,10
259:13
authored
72:25 73:1
110:13
authorized
72:25
availabi...
151:1
available
44:21
48:11 76:7
76:9
102:21
105:25
106:5
112:7
149:18
181:19
261:6,7
average
114:14
awards 73:3
aware 9:24
10:12 12:5
18:22
19:18
22:21
23:13,18
34:15 46:6
46:9,25
47:2 63:24
64:2 65:13
80:13
142:25
154:10
267:7
286:11,15
awfully
132:23
Aylo 1:3 4:7
4:25 8:2
9:25 10:13
10:16 12:5
30:19,23
Aylo's 18:7

B

B 23:4 29:8
29:12
B-a-m-b-a
76:12
B-o-x-e-r
146:3
B2 1:9,10,11
1:12
B2)2 1:13
back 21:5
37:6 58:12
68:14
69:20 86:1
88:4 90:11
94:14
101:9
106:7
107:3
109:3
120:24
140:18,22
142:14
154:17
160:10
170:22
174:19
175:16
181:8,23
191:19
201:24
207:15,23
211:2
213:17
215:18
235:10,12
236:1,3,8
241:9
244:9
246:17
249:14
263:24
274:3
276:25
277:16
288:6,25
293:15
297:21
back-and...
25:6
background
23:5,10,14
23:19
126:3,7
256:3,7
282:14
bad 139:7
280:5
Baker 1:21
2:11 4:14
5:2,4,5
12:20,21
ballpark
17:9 120:8
Bamba 76:12
76:16
78:22
79:24,25
91:4,6,10
91:11,12
91:16,22
92:11,18
93:12,14
93:15,21
94:3,5,9
94:17,20
95:2 96:7
96:10,21
96:22,23
97:14,19
98:2,17,23
99:4
bandwidth
91:7,17
92:12
100:9
105:12,14
105:25
106:5
149:18
150:25
169:13
170:10,18
181:1,7,18
185:15,17
185:20,25
186:11,13
267:15
293:24
295:8,18
295:20,22
297:10,11
297:15
298:13
bandwidt...
185:1
banned 96:7
Barbara 1:19
1:24 4:11
303:2,17
base 98:16
based 31:23
32:11,24
37:18
100:9
106:12
107:2
150:25
184:23
284:3
295:2
bases 43:16
96:20
basic 260:15
basically
125:6
basis 7:23
43:21,22
84:13,20
85:7 87:16
bear 29:19
30:14
38:11
bears 30:23
beginning
67:21
70:15
141:20
227:16

97:18 98:2
126:10
127:22
130:18
134:15,16
151:11
168:16
188:2
262:20
behalf 2:5,9
2:15 5:8
11:13 24:3
35:8 61:14
belief 82:5
82:9 92:5
239:8
263:18
believe 7:1
8:22 10:22
11:11,21
12:15 15:3
15:5 16:15
16:23 19:5
20:9,25
22:5 23:25
29:7 50:1
50:4,17
56:25 65:3
76:13
83:15 84:7
91:14,14
112:16
141:15
156:1
176:18
203:17
209:21
237:1,24
239:8
259:5,18
263:5
265:9
266:7
believed
92:5,22
believing
7:23
bemused
265:23
266:23
bemusement
268:3
Ben 24:12
beneficial
267:4
benefit
263:20
best 6:23
22:19
50:12
120:23
129:20
147:19
148:8,20
149:2
283:17
295:1
better
137:18
264:5
268:14
280:3
beyond 38:2
38:4
bidirect...
113:3
big 151:4
205:4,7
264:23
bigger
100:24
bit 51:7
52:22
56:11
63:21
74:24 75:9
75:22
100:1,3,8
100:12
105:5,5
107:5,7,8
107:10,13
107:16,24
108:1,15
108:17,18
109:3,3,6
109:7,13
109:17,22
109:25
112:8
115:18
117:4,7,8
117:11,20
117:22,22
117:25
118:11,15
118:20,21
119:9,12
119:23,24
120:3,3,4
120:11,11
121:3,8,19
122:3,4,16
124:11,16
125:12
129:16,17
130:1,4,6
130:24
131:2,7,8
131:12,18
132:14
134:19
135:1,9
142:4
143:2,24
149:24
150:1,23
177:15
195:9
198:17
199:10,13
210:1,13
236:9
239:13,22
240:4,14
240:17,25
241:5,12
242:15
243:11,19
285:14
287:16
288:2
293:7,19
294:1,7,7
294:11
bits 107:18
135:13
199:3,7
block 171:4
171:5
Blockbuster
205:4,16
205:21,21
207:1
board 1:1
87:20 88:3
bone 146:22
bottom
179:19
289:1
297:5
298:7
Botts 1:21
2:11 4:15
5:2,4,5
12:20,21
Bowl 63:10
Boxer 146:3
brackets
245:4,8,12
245:24
break 51:10
58:20,23
59:10
145:8,19
177:6
198:11,13
198:21
235:1
251:13
299:8,13
breaking
101:1
BRI 114:8
briefly
215:25
brilliant
51:22
British
56:24
broad 43:3
broader 67:9
brought
146:2
browser
214:25
Brueck 48:16
49:9,19
52:3,16
53:12 54:5
54:6
159:14,16
233:23,24
buffer
203:10
building
2:13 74:2
108:21
283:25
burden 29:19
30:14,23
31:14,22
32:10,22
37:22
38:10
243:25
buy 144:6
bytes 96:11
97:20 98:3

C

C 4:1 211:12
211:13
cache 215:5
219:8,8,23
220:1,7,19
222:1,5
263:4
cached
212:18
213:25
214:4
215:8
220:4,12
221:12
California
2:7,8,13
11:15
call 13:4
102:14
105:4
113:8
190:16
207:3
292:2,20
call.Who
299:23
called 5:8
56:20,21
60:11

63:24 64:6
76:12,18
76:24
80:12
102:7,16
105:3
107:6,9,11
114:7
146:3
237:11
261:3
263:9
270:13
297:25
calling
193:15
269:25
295:24
calls 15:24
25:11
34:20
252:16
capability
136:25
210:6
capable
295:16
capturing
180:12
car 138:23
138:24,25
140:19,23
140:23
141:1
292:24
293:2,13
293:17,20
294:5,8
career
283:13
Carmel
155:17,22
156:1,17
156:20,23
Carolina
59:20,20
73:10 74:8
103:17,24
carve 128:22
case 6:10
11:2,8,11
11:14,16
11:18,20
11:24 12:2
22:20
41:20
48:14,17
56:2 79:21
88:6 127:8
132:9
146:23
156:13
167:11
195:24
cases 6:25
7:8,17,23
48:8,20
caveating
96:18
CBS 287:9,19
CDM 267:16
267:23
central
246:23
247:18,24
centralized
248:3
certain
151:20
173:9
certainly
23:12
26:25
109:11
114:3
141:5
146:23
151:4
167:5
168:9
169:22
177:13,13
178:19,19
181:4
187:12
192:18
193:3
209:2
216:3
219:20
220:5
241:7
268:11
276:12
281:3
certify
303:3,9
challenged
45:16,23
challenger
6:18
challenges
8:4 108:4
108:10
challenging
7:2 13:21
35:9
chance 87:19
chances 6:11
242:14
243:9
change 29:15
85:22
100:12
107:17,21
108:14,16
115:17
119:13
120:11
121:11
122:6
124:5,7,8
125:2,5,7
125:8,18
125:22,23
125:24
132:13
135:4
138:2
157:4,7
301:7,10
304:5,7,9
304:11,13
304:15,17
304:19
changed 9:25
10:13
109:14
110:1
124:3
125:4,20
132:18,25
changes
100:9
118:15
123:15,16
123:18,20
124:14,25
125:1,13
135:11
304:2
changing
100:1,8,22
101:7
122:8,9,9
124:1
131:15,17
131:18,19
132:10,19
132:25
134:18
135:6,8,17
144:8
channels
114:8,9
characte...
239:25
240:10,22
characte...
203:21
265:24
characte...
266:1,4
characte...
164:24
charge 14:11
14:12 15:4
charged 15:2
35:20
charging
15:1,3,4
chart 216:8
cheaper
272:16
check 177:5
212:24
220:3,6
checks
212:17
213:23
218:23
219:14
220:11
choices
258:13
chunks 53:16
53:22
54:10
57:12,18
circuit
105:11,12
cite 176:15
176:17
225:7
247:1
cited 15:12
33:14,20
34:1 82:25
83:24 84:4
84:5,7,8,8
84:17,18
85:3,4,12
85:13,21
86:6,22
88:15,15
88:20 89:2
89:10,20
90:4
cites 176:18
citing 45:8
168:23
225:13,15
claim 41:14
41:19
45:22 46:7
46:10,11
46:17,19
58:11
162:10
164:1,1
165:1,3
188:11,15
188:19,20
188:21
189:1,6,12
189:17,23
190:9,15
190:22
191:19,21
191:22

192:1,7,9
192:18
193:2,23
194:2,6,11
194:12
195:17,20
196:1,13
196:14
199:15
203:16,18
204:11,12
204:15,19
205:25
207:5
208:17,22
209:13,19
209:22
225:9,18
226:4,13
231:6,13
231:18
232:3,17
234:6,7,9
234:9,11
234:18,18
234:19,19
235:8,13
235:14,21
235:23
236:10,12
236:22
237:3
244:17,20
245:14,18
245:24
246:4
247:5,12
247:16,18
249:16
253:2,5,10
253:14,19
253:21,23
254:8,11
254:15,16
254:19,21
255:4,18
256:4,8,8
256:15
257:3,25
claimed
162:10
188:21
199:17,23
claiming
225:24
claims 33:7
36:10,11
36:14,15
38:17
41:19
45:17,23
46:22 58:9
58:10 86:9
86:25
162:10
163:14,17
163:21,21
163:23
164:23,25
165:8
225:2,12
231:25
234:3,12
234:17
246:20
249:3,11
251:11
253:10
clarify
236:1
clarity
57:20
class 74:4
classes
233:20
clear 29:20
30:9,15,24
31:4,23
32:23
37:12,23
38:7
192:17
199:2
218:10
221:5
233:1
274:10,17
275:8
clearly
79:23
clicked
203:5
client 54:11
55:5 93:13
94:4 96:9
97:16,18
98:1,2,18
142:8,9
197:20
212:1,16
212:18
213:9,23
213:25
214:7,8,13
214:14,17
214:18,23
214:25
215:5,16
218:2,8,17
219:20,24
220:1,3,4
220:6,12
220:20,25
221:9,16
221:20
222:1,11
222:15,16
223:4,12
223:13,15
223:19
225:3
233:17
234:7
244:24
246:22
249:4,6,8
249:12,14
249:22
250:2,6,6
251:22
252:9
254:1
255:9,19
255:22
256:11,21
257:5,11
257:17,21
257:25
258:2,6,10
258:12
263:3,24
264:8,15
265:4
271:7
284:22,24
client-side
53:23
clients
155:22
clip 96:8,10
97:25
245:25
clips 96:7,8
97:15
98:24 99:5
code 106:16
106:17,19
107:3
125:2
136:5,7
codec 67:18
67:19 75:9
75:23 76:1
76:5,6,7
107:17,19
107:24,25
108:12,12
108:14
119:3,6
121:2,11
122:7,9,10
122:15
123:9,11
123:16,18
123:20,24
124:4,5,8
124:9,10
124:11,12
125:9
131:12
133:13
136:12
140:4,15
140:16
144:7,8
149:25
288:20
codecs 73:18
133:20
coded 109:14
131:15
135:22
coders 117:8
codes 294:24
coding 54:22
115:17
195:16
210:8
298:17
codings
295:22,23
collabor...
103:4
121:15
collabor...
102:17
collabor...
123:11
colleague
4:23
collection
48:19
190:3,3,4
190:6,16
190:18,19
190:20
191:9
204:3,5
213:8
214:21
215:2
227:24
228:6,22
229:3,13
229:15,16
229:22
230:1,3,6
240:15,18
240:21
collections
215:15
collecti...
9:8
Columbia
1:20 303:1
303:3
column 111:6
112:1
121:1
128:7

134:12
141:19
166:5,8,19
167:16,20
168:16
169:7
176:23
177:9,16
177:23
179:19
182:3
184:3
185:7
186:17
187:24,25
188:5,5
213:2
216:4
219:2
227:9
251:2,4,10
251:16,20
253:18
combination
31:24
32:12,24
188:7
224:8
287:14
combinat...
287:4
combine
134:7
come 50:11
50:15
58:12
76:11
135:12
225:15
comes 45:3
133:13
162:20
coming 50:5
55:2 75:8
75:9,22,23
117:8
122:8
136:11
288:20
command
212:1,4,9
commencing
1:22
comment
222:22
277:7
commercial
64:3,6
commerci...
48:11 76:9
102:20
112:7
Commission
11:5,7
303:20
common 55:6
163:11
244:6
284:9
commonly
152:9
communicate
93:14 94:5
167:21
communic...
167:25
169:20
170:1,8
communic...
168:25
233:6
284:23
communic...
66:25
68:12,19
71:24
72:12 99:6
169:13
170:7,10
170:18
284:10,24
communic...
184:12,18
community
65:10
companies
62:7
company
10:12
63:24
comparable
241:22
compare
280:2
compared
120:11
293:23
294:11
compatible
241:23
compensated
13:23
compensator
140:4
completely
133:22,23
208:25
236:6
complies
8:20 23:2
27:20
38:14
59:18
62:15
63:22
66:11
78:19 91:2
93:10 98:9
98:13
99:12
126:4
143:9
147:3,12
147:15
151:7
153:2
156:3
159:7
160:17
166:7,10
167:18
188:13,17
196:20
201:20
211:13
227:22
231:14
238:20
251:6
253:7
262:22
269:9
282:3,17
component
152:24
components
143:17,25
144:13,20
compression
91:8,18
210:9
comprise
44:12,22
44:23,24
166:21,24
167:8
208:3
comprised
259:25
computer
74:3 104:9
243:8
computers
73:19
concept
52:23
116:18
117:16,21
118:1
261:19
262:1
conception
164:9
175:5
concepts
43:19 44:2
53:19
168:13
187:6
conceptual
271:13
concern
157:22
158:18
concerning
156:23
285:14
concert 63:1
63:8,9
conclude
39:13
150:3
301:18
concludes
301:21
conclusion
25:11
252:16
Conclusions
143:12
conditions
181:21
201:12
conducted
48:4
conducting
35:12
290:22
conference
102:3
164:12
conferences
59:23
143:19
144:14,21
conferen...
72:22 75:5
101:18,24
102:7,18
102:21
103:2
106:11
110:15
113:10
119:2
121:16
126:10,16
126:25
127:2,13
147:21,24
148:12
162:19
confident
88:6
Confiden...
281:3
configur...
172:9
configured
44:12

244:23
253:11,15
confirm
92:21
98:20 99:1
99:8
confirmed
22:12,17
confirms
187:7
congested
109:7,17
congestion
75:11,25
100:14
128:19
129:4,11
130:24
141:25
142:13,17
142:22
281:24
282:8
284:11
287:6
conjure
257:15
connected
203:9
connection
42:6
105:13
106:5
156:11
200:6,14
232:24,25
233:5,7,22
234:1,4,24
235:15
237:11,14
237:15,19
237:20
253:17
267:16
269:14
270:3
connections
91:8,18
92:13
95:14
231:20
232:13
233:16,17
234:8,11
237:5,8,12
237:13,13
263:3,9,19
263:23
264:8,15
265:4,16
266:14,18
266:21
267:3
268:4,8,13
268:14,19
269:20,23
270:2,4
connecti...
239:12
241:24
243:20
277:15,21
connotes
291:17
consider
37:16 44:6
80:25 81:9
81:25
82:11
84:10,16
85:2,6,11
89:17
115:22
116:1
117:11
118:10
119:12
120:3
267:25
273:2
considered
25:17
26:12,23
32:20 33:6
37:17
39:10
65:17
67:10
81:20 82:7
82:15 84:6
85:24 86:8
86:24
116:4,6,19
116:20
117:4,20
117:21,22
117:25
118:14,21
119:9,17
120:16
206:21
264:24
268:23
295:16,19
considering
84:22
consistent
285:5
consiste...
28:18 29:5
29:12
278:8
consists
25:24
constant
101:6
115:18
118:18
119:15,20
constantly
284:22
constitutes
229:15
constraints
127:7
132:4,7
constructed
149:15
construc...
39:14,20
40:9,14,21
41:4,15,22
42:18
45:17,23
46:11,19
97:8
construed
38:23
41:20
consult
129:21
130:10
consumption
164:12
contacted
12:16,17
13:3
contacts
123:14
contain
172:10,23
contemplate
273:21
contempl...
181:5
contempl...
197:18
contempo...
164:8
content 36:6
50:23 51:4
51:13,15
51:15 55:5
60:17
120:7
138:20
140:14,15
166:13,17
166:18,21
166:24
167:8
171:8,22
173:3,9,10
173:12,13
173:15,17
173:20,22
173:24
189:8,15
191:8
192:3,12
192:23
193:6,25
194:3,4,6
194:7,8,14
194:19,25
195:2,8,22
196:2,4,10
196:11,17
197:19
201:11
202:14
203:20
204:1,2,9
204:12,14
204:18,25
205:18
206:3,15
206:15
207:21
208:3,19
208:20
209:4
210:12,14
210:16
212:10
214:9,14
214:19,24
215:1,4
237:18
246:22
247:17
249:9,9,16
249:24
250:5
256:1
267:17,19
287:14
288:12,14
290:12,14
contention
146:23
244:8
contents 3:1
137:13
171:14
207:24
287:19
context 25:3
50:5 57:3
99:21,23
103:1
135:17
143:4
157:6
163:2
164:13
166:12
187:11
199:8,15
206:22

264:12
265:10,12
266:16
287:16
294:11
continua...
89:12
continuous
164:10
contradi...
87:18
contrast
164:7
contribu...
73:3
control
74:15
217:25
271:8
282:24
283:6,15
controlled
74:14
102:7
controller
217:20
218:1,4,7
218:16,19
218:22
219:10,14
219:22
220:3
convention
31:6
conventi...
92:24 93:2
167:25
168:1
169:2
convert
240:2,12
241:4,11
converts
239:21
convey 248:6
conviction
31:5
convincing
29:21 30:9
30:15,24
31:4,23
32:23
37:12,23
38:8
cool 279:17
copies 56:11
267:10
copy 83:14
176:21
core 52:4
correct 6:21
7:11 8:5
10:14 12:3
12:4,11,12
12:14,15
13:24,25
14:21
16:18
17:15,16
18:3,19
19:7 21:2
22:6,15,18
25:9,18
26:13 28:8
28:13
29:13,17
29:25
30:10,25
31:7 33:3
38:20
39:22
40:24 41:4
41:5,8,22
42:14,19
42:24 43:4
43:14,15
43:20
44:20,22
45:24 46:4
46:23
49:25 50:1
50:4,16,17
51:13
54:13
59:23 60:1
60:4,8
62:6,9,18
62:23
63:25 64:4
64:10 65:2
65:10,14
65:19 66:2
66:21,22
67:2,13
68:3,4
70:15
71:17 72:8
72:9,14,22
72:23 73:3
73:4,21
74:8,9,11
74:25
75:14,25
76:2 77:16
78:3 79:15
80:20
81:21
84:11,18
85:4 86:9
91:9,13,15
92:16,20
92:25 93:4
93:16,20
93:23 94:1
94:22,25
95:3,11,14
95:16,19
97:16,20
97:21 98:5
98:19,22
98:25 99:3
99:7,10
103:25
104:4
110:20
111:19,24
112:4,9
113:14
119:14
120:4,21
122:18
125:13
127:4,15
128:24,25
129:13,17
134:23
135:9
136:22,25
137:8,22
139:15
142:18
144:1,15
145:4
146:8,14
146:18
149:4,11
149:13,14
149:20
150:2,10
150:11
152:6,11
152:19,20
152:25
153:20
155:19
156:18,25
157:24
158:15,20
159:1,2,4
159:5,14
159:15
161:16,24
162:15
163:5,6,19
164:22
167:9
168:23,24
169:21
170:11
171:14,22
172:10,14
172:20,24
174:1,22
174:24,25
175:20
178:25
179:12,17
179:22,23
181:9
182:25
186:24
187:18
188:8,10
192:4
193:7
199:11
200:8
201:6
203:13
207:21
209:9
212:2,6,11
212:19,22
212:25
213:25
214:5,9,15
214:19,24
215:5,10
215:16
218:4,7,20
218:21,24
219:15
220:13,16
220:20,25
221:9,10
221:14,17
221:21
222:1,11
223:23,24
224:2
225:5
226:16
231:1
232:5,9
236:20,25
238:17
239:13,23
239:24
241:6,13
243:20
244:1
245:10
246:2,3,10
246:12,13
246:15
247:3,4,7
247:14
249:22
254:13,23
255:24
261:3
266:8
269:14,16
269:23
270:11
272:3
274:15
276:8,13
278:11
280:9

282:8
283:7,10
283:15
285:21
286:8
287:20
289:14
290:10,16
291:15
292:7
295:18
296:21
297:3,4
301:4
corrected
22:23
23:15
223:22
correctly
72:18
74:19
132:15
164:18
correspond
179:3
191:8
194:3,19
196:2
204:24
205:9
correspo...
178:13
correspo...
160:22
161:15
162:15
163:4,9
164:15,22
165:6
167:24
168:7
182:5,9,12
182:15,23
183:2,11
183:14,19
183:23
184:6,9
188:3
189:14
190:5
197:8,13
198:23
206:3
207:16
208:19
296:12
corresponds
177:25
178:8
189:8
192:3,12
192:22
193:6
194:8
196:6,10
204:2,4,13
205:10
206:14
207:21
209:4
Cotton 63:10
counsel 2:18
3:19 4:17
15:14,15
22:7 28:8
58:24
69:10
205:20
228:12
229:7
273:7
301:17
303:9,10
count 5:17
counting
5:18
country
242:13,14
couple 182:2
276:25
course 20:1
76:10
105:17
128:8
court 2:25
4:12,13,19
12:7
299:19
301:25
302:5
303:2
courts 10:17
cover 16:25
16:25 17:2
17:3,21,21
17:24,24
22:9,9
33:21 61:9
61:21
85:16,20
238:11,11
238:17,17
cover-to...
259:8
280:15,18
covered
62:11
131:23
create 202:7
207:20
208:14,24
209:3,6,11
209:15
creating
171:6,12
171:20,25
creation
205:13
crisp 274:10
274:17
275:8
critical
273:2,9,11
273:15,16
274:1
CRR 1:24
303:17
crunching
294:12
culminated
72:20
curious 56:7
266:5
current
149:22,25
150:25
213:7
215:15
customary
14:3
customers
281:6
customize
250:1

D

D 2:12 4:1
114:8
D.C 1:15,22
4:16
Dallas 63:10
Daniels
103:15,15
DASH 51:20
51:22 52:4
52:5,18,24
53:1,9,19
53:20
151:3
272:5,8
284:18
data 66:21
67:1,23
68:6,21
69:24
70:24 71:4
71:12,17
71:25 72:8
72:14
101:7,8
107:23
108:1
109:12,20
109:21
113:20,24
114:4,11
114:16,23
114:23,24
114:24,25
114:25,25
115:3,6,8
115:9,9,9
115:10,10
115:19,22
116:2,4,6
116:19,20
119:21
122:10
131:17,20
131:25
133:12,14
134:7,8
135:1
136:11
147:18
148:20
149:1,7,16
149:22
150:10
155:23
189:20
193:11
195:5,13
196:24
197:3
198:18
199:16,22
204:21
209:5
261:16,23
262:6
270:20
287:2
288:20
294:13
date 69:3
70:3
130:18,22
147:7
149:3,8,13
261:10
301:22
dated 259:11
280:21
David 20:3,4
20:7
day 88:10
89:14
304:23
days 280:17
302:5
deal 75:11
75:24
100:13
129:4,11
137:1
144:7
dealing
128:18
181:17

decide
133:14,17
decided
133:12
decimation
133:14
decisions
285:13
declaration
3:9,10,13
11:22,25
15:11,12
16:14,21
16:25 17:4
17:5 18:6
19:19,21
20:24 21:2
21:4,19,21
29:24 31:2
38:9 39:21
39:24 42:3
42:6,11,17
46:4 49:20
61:5,14
64:15 66:5
77:15 79:9
81:14
84:20 86:2
86:12,15
87:4 90:12
91:21
92:17 93:7
94:7,11,15
94:17
101:10
120:23
121:14
145:25
152:21
153:7
154:18
160:11
170:22,24
224:23
300:15,19
300:24
301:2,9
declarat...
15:9 16:13
16:17,20
20:2 29:6
40:13,19
declare 92:2
declared
145:6
decode 97:18
98:2
decoding
96:10
dedicated
105:12
defendants
29:19
30:13
38:11
defer 99:15
define 44:12
44:18
defines
293:22
defining
229:14
definite
158:10
definitely
12:21 36:8
85:17
108:11
definition
28:19,20
33:22
145:5
294:25,25
degraded
293:10,10
delay 66:17
deliver
186:4
223:12,13
delivered
91:7 92:12
220:24
221:8
222:10,16
222:24
223:4,18
delivering
91:17
97:10
217:16
delivery
60:17
149:18
150:25
154:12
162:24
288:8
290:9,15
290:22
302:9
demand 48:9
48:13 49:2
demonstr...
71:6,8,10
75:5
149:10
261:9
demonstr...
111:1
149:6
Deniles
103:14
denominator
244:6
department
74:3 104:5
104:7,8
depend 37:2
39:19
40:13
118:3,4,4
138:19
140:13,14
185:20,22
185:25
199:18,21
depended
40:17
depending
114:7
137:12
184:11,17
187:11
293:8
depends 6:6
116:14
117:5,17
118:12
137:12
234:9
242:4
293:21
deployed
92:19
157:23
158:19
deposed 5:14
19:10
deposition
1:17 4:6
4:14 8:1
12:10 15:8
17:11,14
17:22
18:10,12
18:18
19:12,15
19:24
20:15,17
20:20
58:25
59:10
145:19
198:11
206:19,23
248:21
286:23
299:8,9,23
301:18,22
derive
263:20
derives
265:14
describe
30:8 48:3
73:13
104:18
120:1
139:3,5
251:21
252:2,8
253:14,19
291:7
described
96:24
112:15
113:17
121:23
122:20
124:21,22
130:12
131:13
232:23
257:3
296:12
describes
43:7
110:24
143:5
233:23
251:17
281:8
282:6,9
describing
97:23
108:24
109:2
140:2
158:4
191:12
217:7,14
217:15
224:7
252:4
254:9
263:8,14
263:15
281:23
282:13
285:9
description
3:6 111:7
111:11
134:13
217:5
255:2
256:2
285:4
Deshawn 2:17
4:10
design 255:8
255:11,21
256:20
257:10
258:13
266:20
designated
165:19
designed
98:24 99:5

113:19,24
114:15
designing
253:24
desirable
265:13
desire
112:18
desired
215:9
detail 64:11
113:15
114:2,19
116:9,10
116:15
160:7
252:21
291:8
details
25:22
79:20 81:7
82:21
91:22
116:13,14
122:11
124:22
detect
141:25
142:17,22
detected
149:16
196:24
197:3,6
212:25
215:13
detecting
142:13
determin...
6:11
determine
118:6
determined
149:23
develop 72:3
developed
56:8 60:15
66:19,24
67:13 71:6
71:10 75:4
104:11,19
105:20
108:7
110:20
154:1
developing
68:2 72:21
development
65:1 67:8
67:15
68:11,16
68:18
70:18,21
72:5,11
79:7 108:9
device
232:17
239:12
240:1,11
240:23
241:13
243:19
244:24
245:3
246:5,7,8
246:9,23
247:6,13
247:18,22
247:25
248:1
devices
133:23
246:11,15
247:7,14
247:19,22
diagram
216:8
dice 53:15
difference
107:15,16
138:11,22
193:14,14
193:18
266:11
differences
108:25
109:2
193:19
195:3
different
8:4 28:20
29:16
56:11 87:9
87:22
101:4
119:13
130:7
133:23
163:21
167:6
173:3,9,10
173:13,14
173:21,23
182:10,13
182:20,23
183:2,15
183:18,20
183:24
184:8
185:4,12
185:15,17
186:11,13
189:7,18
189:19
192:2,21
193:5,10
193:11,16
194:4,6
195:5,9,12
195:13
196:7,14
196:17
198:17,18
203:20
204:21
207:20
208:3,18
208:25
209:5,15
210:21
219:25
240:3,4,8
240:13,14
240:24,25
241:1,24
241:24
243:1,3
244:21
246:21
247:17
248:3
270:23
287:4,4
289:22
291:22
293:23
differently
285:8
293:22
difficult
31:25
32:12,25
37:10,11
37:14,21
86:6,22
107:20
273:20,25
digital
35:16
dimension
152:4
diminished
135:24
136:1
directed
164:8,9
165:10
direction
1:25
directions
106:10
disagree
21:13 34:6
42:8 58:4
74:20
87:11
251:14
263:22
264:13
265:21,22
266:3
disagreeing
263:11
discarding
135:23
disclose
57:11
111:11
160:20,25
161:9,10
161:13
162:13
167:7
175:9
176:1
181:22
188:6
229:2
252:20
disclosed
54:20
150:23
155:22
172:13,19
174:8
194:17
215:6
219:21
225:16,22
226:2,9
discloses
43:12
57:17
168:6
169:18
170:6,14
171:6,12
171:19,24
172:8,21
174:20
175:1
176:5,8,8
178:6
179:11
182:19
183:17
189:1,12
191:21
194:18
219:1
227:24
228:6
229:21
230:5
243:24
disclosing
189:24
190:2,10
190:23
192:7,9
disclosure

9:18,19
52:11 80:4
80:12,19
81:18 82:1
82:6,16
143:24
168:3
174:3
176:3,10
181:10,25
182:1
184:15,25
187:13
201:10
205:25
207:5
226:18,19
disclosures
129:21
163:13
173:11
176:19
178:21
180:15
discounts
14:5
discreet
17:2,2
discreet...
57:12,18
discrete
52:19
53:22
54:10
discuss 9:18
13:6,14
28:6 40:24
42:13
102:6
145:18
176:13
discussed
33:15
45:12
110:17
150:13
153:23
175:22
215:10
284:10
292:10
discusses
296:2
discussing
167:11
283:3,5
discussion
145:11
150:18
298:25
300:2
302:6
discussions
9:19 15:14
Dish 1:6
2:18 4:8
5:3 8:4,23
10:16,21
10:21 11:9
11:13 12:5
12:9,16
13:23 14:5
14:13 15:1
15:4 57:5
86:4,20
95:18
96:13 97:2
272:6
274:20
Dish's 8:11
9:2 15:14
16:17,22
21:7,10
22:7 27:5
27:14 28:8
34:1,9,18
35:21 42:4
64:16
65:19,20
66:6 97:7
150:14,22
153:8
154:11
160:3,11
170:24
201:23
202:1,3,5
204:24
224:24
225:8
230:18,21
235:13
275:1
284:15
285:6
disks 248:2
dismissed
90:5
display
97:19 98:2
180:13
223:5
displayed
139:9,16
139:17
151:19,21
151:24,25
152:5
185:14,16
186:6,10
186:12
290:3
displaying
96:10
dispute
30:20
94:20,23
95:1,6
114:21
dissatis...
276:8,10
disserta...
24:7
104:23
distance
59:22
distinction
204:20
distinct...
24:21
distinctly
146:25
distinguish
163:1
167:4,5
distribute
267:12,22
distributed
240:7
distribu...
164:10
239:17
distribu...
158:25
188:21
191:22
239:4
295:8
District
1:20 11:15
11:18,21
12:1,2
303:1,3
doctor 5:13
41:25 53:3
58:1,20
59:9 61:11
69:17
85:10
87:19 89:1
91:25
99:15,20
124:24
141:12
145:18
162:7
198:10
228:19
234:25
248:9,20
273:13
299:7,15
document
40:1 47:11
61:2 77:12
77:23 83:9
130:15
141:16
146:5
201:23
258:21,23
259:2,4,5
259:11,13
260:14,21
280:6,8,12
280:21,24
281:1,3,5
281:7
283:3
284:4
286:23
291:6,21
291:22
292:6,9
295:15
documents
40:4,6,13
156:5,11
291:21
dog 242:21
doing 67:5
70:8 76:18
95:7 96:7
106:12
107:14
115:17
234:25
242:5
267:8
270:24
279:13
284:3
285:11
dominance
158:22
dominant
153:13
dominating
119:8
donated
73:18
dong 242:8
doubt 10:7
38:2,5
download
95:8,25
96:3,12,17
96:19 97:3
97:23
155:23
200:7,16
203:15
downloading
97:1
downloads
96:21
Dr 1:17 4:6
15:11,13
18:6,11,18
218:12

304:22
draft 22:4,6 22:9
drafting 21:15,25
Drew 18:24
drop 285:15 286:13
drops 139:2 140:24 181:1 185:17 186:13
Duke 59:20
duly 1:19 5:9
duration 151:20 182:11,21 183:4,10 183:10,16 183:22 209:9,14 209:20 233:25 276:3

E

E 4:1,1 298:4,7
earlier 18:12 49:13 56:6 56:13,15 108:24 109:2 117:19 121:10 133:11 148:18 150:13 175:22 177:16 186:18 204:10 213:22 215:10 222:23 231:3 300:12
earliest 55:8,14,17 56:3 71:2 147:7
early 10:23 47:25 48:6 64:3,25 74:24 119:4 157:21 158:1,8,11 158:13 159:3
easier 125:21
Eastern 4:3
easy 116:22
EchoStar 20:12
Edell 2:19
edge 239:18 239:20 240:2,12 241:3,10 243:17,22
effect 140:3
effective 154:1 288:2
effectively 37:19 225:15 267:15 272:7
effects 136:8 137:1
effort 147:19 148:8,20 149:2
efforts 108:9
either 10:22 56:18 124:2 202:17 287:14 294:24
elegant 51:23
element 200:23 201:5 225:18 228:3,7,24 229:4,24 230:7
elements 126:17 127:3,9,14 127:16,18 197:4,7,12 198:22 226:4 227:25 228:24 229:19 230:3
elimination 271:15,21 272:10
Eliot 2:12
Elliot 5:5 300:1
embed 202:12
embodiment 167:10 176:1 178:7 189:24 190:10,23 192:7,10 195:18,21 213:14,15 216:9 217:7
embodiments 169:8
emergency 285:15,21 286:8,14 291:19,23 291:25 292:11,14 292:17 293:1,6,6 293:14,18 293:25 294:6 297:25 298:3,12
emitted 122:10
employee 20:12 205:5 303:10
employees 205:4
empty 243:1
enable 66:20 72:6 106:20 252:22
enablement 252:12
enables 98:3
encode 138:9
encoded 51:6 108:14 139:21 140:8 166:13,16 199:9,13 288:21 297:17
encoder 71:14,21 71:22 240:5,16 243:18
encoders 66:24 67:6 67:8,13,15 67:22 68:3 68:5,8,9 68:16,18 68:20 69:14,21 69:23 70:13,18 70:19 71:11,15 71:19 72:11 239:18,21 240:2,7,12 240:19,20 240:21 241:4,11
encodes 288:17
encoding 52:20,21 54:24 70:2 70:9 150:23 210:9 240:6 243:17,25 275:24 293:24 294:19 298:18,20
encodings 53:23 54:11 240:9 267:11,12 267:22
encountered 10:11 49:7 49:14,16 51:21 55:23 284:17
end-to-end 95:13 106:23 129:3,10
ended 112:19
engagement 49:6
engineer 73:15,20
enhanced 197:8,13 198:23 199:5,10 199:11
entered 293:17 294:5
entering 157:24 158:20
enters 292:25 293:14

entire 23:8 27:5,13 278:2,17 279:16
entirety 82:11 275:6
entitled 258:24 292:6
entity 219:16,19 220:9,11
environment 109:8,17 118:7 242:5
episode 278:23
equal 200:7 200:15,18
equals 296:16 298:4
equipment 162:19
equipped 93:13 94:4
equivalent 275:25
Ericson 20:3 20:5,7,11 20:14
Ericson's 20:23 21:2 21:4
ERRATA 304:1
error 148:14
errors 23:18
especially 31:24 32:12,25 37:10,11 37:14 86:5 86:22
Esq 2:2,7,11 2:12,18
essentially 17:25 18:2 73:17 104:24 106:12 107:23 135:2 139:15 141:6 289:9 292:1,18
established 147:19 148:21 213:22 236:12 247:5,12
establis... 237:19
establis... 234:1
estimate 105:25 106:5
estimating 149:17
event 63:15
everybody 15:4
evidence 29:21,23 30:9,15,24 31:4,5,23 32:23 37:12,24 38:8 177:13 228:17 300:21 301:10
exact 185:9 210:14 243:11 261:10
exactly 37:2 37:3 47:3 51:19 128:4 195:6 207:24 236:19 261:8 289:7 290:1
EXAMINATION 5:11 300:10
examined 5:10
examiner 32:1,14,18 32:19 33:1 33:6,11,17 33:23 34:13,14 34:16 37:13,16 37:19,20 80:24 81:8 81:19 82:8 82:15 84:10,16 84:22 85:2 85:6,11,18 85:23 86:8 86:24 88:19 89:3 89:17,21 90:5
example 29:4 43:19 44:2 44:10 70:10 80:14 89:16 120:7 140:18,22 148:24 155:18 167:21 168:12,17 169:4,10 172:8 179:18 186:20,24 187:6 195:16 228:2 229:17 233:9 241:20 243:7 262:4 264:11 270:19
examples 43:13,17 43:23 44:3 168:13 169:3,23 172:4 187:7,15 187:17
excited 63:5
excuse 48:19
exemplary 43:7
exhibit 3:6 3:8,9,10 3:11,12,13 3:14,15,16 3:17,19 8:8,10,23 21:5,17 22:4,13,16 22:22 23:1 27:19 28:7 37:7 39:16 40:23 42:1 42:3 47:9 57:23,24 58:2,16 60:23,24 61:25 62:13 63:20 64:13 66:5 77:6,7 78:12 83:4 83:5 90:12 90:19 91:25 99:11 101:9 110:6,7,10 110:13 120:25 126:2 141:15 143:8 145:22,23 145:25 147:2 150:12 151:5 153:6,9 154:17 160:9,10 165:12,14 165:16,17 165:20,20 165:24,25 166:2 167:13,13 170:23 201:14,15 201:19,25 208:6,7 211:2,3 215:18,19 215:20 224:23 230:14,21 235:5 237:25 238:3,6,7 244:9 245:15,22 248:24 250:9,12 258:19 260:20 265:21 266:1 269:1 274:4,9,22 274:23,25 280:6,7 281:11 286:19 287:1 292:5,5 294:16 296:1 300:16,24 301:9
exhibits 3:5 15:11
exist 102:16 243:14
existed 70:10 97:10,11

278:5
existence 56:9
expect 99:14 200:7,16 200:19
expected 145:4 189:19 195:13 196:15 199:16,22 200:21 201:5 204:21 209:5
expense 162:20,22
expensive 144:4
experience 6:24 36:4 89:8 135:25 136:2 137:17,19 137:21 138:16,23 138:25 139:3,7 179:25 180:1 239:6,10 239:16 275:18
experiment 60:16 112:4
experime... 288:2
experime... 252:24 255:5 256:5 257:4
experime... 111:12,18 287:17
experiments 111:21 143:16 287:3
expert 5:20 8:10 10:9 10:21 11:9 11:14 12:10,17 13:5,13 21:6,10,16 21:25 22:9 27:22 28:3 28:7,11,17 28:20,21 30:7 38:13 47:21 48:7 59:13 61:4 61:11,14 62:3,8 77:14,19 78:5 86:5 86:21 93:7 146:11,16 153:7 177:11 244:10 249:1
Expires 303:20
explain 87:20,21 88:3 179:4 267:2 270:15
explained 24:20
explaining 290:1
explains 260:21
explanation 237:1 253:23 254:16
express 39:16 45:18 46:3 275:17
expressed 40:13 46:18 274:10,14
expressing 268:3
extent 53:15 157:6
externally 92:20
extract 174:15
extremely 139:21 140:8

F

face 33:14 34:1,5,10 34:12,18 35:21 36:16 82:25 84:4 84:6 86:6 86:23 87:17 88:20 89:2
Facebook 146:2,10 146:13,16 152:22 154:18 155:6 156:12 159:22
faced 108:5
facilities 59:22,25 60:3,6
fact 37:16 54:23 174:4 183:5 262:5 265:14 267:9,20 268:3 273:23 279:14
factor 162:22
facts 29:20 30:14 116:22 287:16
factual 25:13,16 26:6,10,15 26:22 31:6 34:21 35:4 35:5 286:11 290:2
faculty 74:5
fails 270:4
fair 9:24 35:24 60:18 65:3 65:5 78:7 87:10 100:7 102:25 106:21 109:8,18 111:5 114:23 135:5 139:10 140:7,12 157:4 185:18 186:14 200:17 203:21 206:16 216:15 217:4 223:5,19 223:20 236:24 249:14 258:14 274:12 275:7
fairly 262:8
false 92:6
familiar 24:14,24 56:19 57:3 60:10 140:1 201:22 202:4 211:16 216:1 250:16
familiarity 24:16
family 47:6 49:7,24
fans 63:13
far 46:15 56:14 123:19 137:24 156:25 280:3
far-reac... 271:13,20
fashion 126:18 127:10,10 127:20
fast 14:17 45:8 52:2 96:9 97:16 98:1,4 132:23 168:23 302:12
faster 267:17
fastest 302:4
fault 155:5
feat 170:5
feature 279:14
features 54:19
feed 106:6 164:11
feedback 106:13 141:25 142:16,21
feeding 142:13
fellow 24:12 103:21
field 56:7 160:4
Fifteen

149:12
fifteen-ish 17:12
fighting 162:4
figure 53:4 117:14 211:12,14 211:16,20 211:21,21 211:25 213:17 216:1,8,24 217:2,6,18 217:22 218:11 221:18 222:2 224:6,6,9 224:19 250:14,16 250:18,21 250:22 251:20 253:18
figures 9:22 238:14
file 24:9,13 25:23 27:1 27:2,9 44:12 82:12 93:15 96:11 166:13,16 166:17,18 166:21,24 167:8 199:18,21 199:24 200:1,4,5 200:8,13
filed 8:1 13:20 24:13 155:17
files 51:4 51:13 97:19 98:2 261:16,23 262:6
filing 254:3 254:23
filings 12:13
final 302:12
finally 186:16
find 47:18 83:19 106:18 140:15 185:8 230:17 236:3 287:2
fine 9:9 58:21 92:7 99:16 128:11 235:2
firewalls 157:22 158:18,24
firm 4:22 117:1
first 5:9 10:20 12:16 15:22 22:6 35:25 46:24 49:13,16 51:21 55:22,23 67:18,19 71:6,8 72:21 87:13 96:11 97:19 98:3 111:10 127:25 130:17,21 153:4,11 154:24 155:10,11 162:22 164:6 168:19 172:8 178:25 179:1,11 179:13 186:23 187:17 188:22,22 189:1,5,8 189:14,18 189:24 190:3,10 190:14,23 191:5,6,15 191:16,23 191:23 192:3,5,7 192:10,13 192:17,19 192:20,23 193:3,4,6 193:9,20 193:24 194:2,8,12 194:21,23 195:4,18 195:21 196:9 197:3 203:17 204:4,5,7 205:11,15 205:25 207:5 259:22,23 260:13 261:14 262:16 269:4 271:7,11 277:8 278:17 281:21 282:5,20 282:23 284:17,18 294:23 297:23
five 8:1,25 9:1 52:2 141:11 197:24 248:9
five-minute 299:12
fix 148:16
fixed 113:20 151:25
flag 88:9
flagged 83:15,19
flip 83:22
flow 74:14 75:17 216:8 282:25 283:7,15
fluctuate 277:13
fly 100:12 206:23 212:2 222:6
focus 72:5 126:9 169:5 231:12,17 234:18 282:21
focused 162:24
focusing 29:3 191:17 262:25 297:23
follow 175:24 187:7 198:24 243:22
followed 4:18
following 11:6 288:9 290:18 295:1 304:2,3
follows 5:10 115:14 143:5 266:19
footer 259:10 280:20
footnote 59:16,16 64:21,21
foremost 277:8 278:18
form 7:4 14:15 28:23 33:19 36:24 40:16 45:5 46:1,13 52:14 54:15 55:20 60:20 68:24 69:8 72:16 75:2 81:22 87:2 87:25 89:7 89:24 95:21 97:6 101:24,25 102:14,18 109:10 115:12 120:14 121:21 122:24 130:3 137:10 138:14 140:11 141:3 148:1 173:20,21 174:13 175:12 180:4 184:21 187:10 192:15 194:16 197:16 200:25

202:25
206:6
207:10
209:17
210:4,23
218:10
222:13
223:7
224:4,13
225:20
226:6,24
228:10
229:6
241:15
242:3,18
254:5,25
255:14
256:13,24
265:7
266:10
268:21
270:8,17
271:25
272:14
273:5
275:10
277:5
278:13
279:10
284:18
285:23
289:16,24
291:2
298:15
format 51:6
173:2,8
239:22
240:16
241:18
243:3,11
243:19
formats
239:13
240:3,13
240:24
242:15
243:2
244:5
forming
29:13
forms 173:23
formulated
51:15
formulation
95:23
forth 28:12
Forty 64:20
forward 52:2
284:24
found 225:2
290:4
Foundation
61:18
110:22
159:24
four 23:25
52:2 94:13
243:10
four-by-...
293:10
fragmented
260:18
frame 50:7
50:15
51:11 52:9
55:16
121:4,8,19
124:16
125:12
134:18
135:4,6,8
135:17
136:5,5,7
136:9,14
136:19
137:2,5,16
138:1,2,10
139:2,2,9
139:14,15
139:16,17
139:21
140:17,24
140:25
152:10
153:18
158:3
206:25
277:7,17
278:15
280:2
294:14,14
297:2
frame--
207:3
frame-per
139:8
frames
127:18,19
135:2,16
135:18,19
135:23,23
136:13,15
136:15,20
136:20
137:5,6,25
138:10
139:1
140:8,24
143:6
173:25
174:2,10
174:15,16
295:3
296:20
297:7,18
298:8
Francisco
2:8
free 128:8
264:18
271:1
Freesite
10:6
Freesites
1:3 4:7,25
8:2 9:25
9:25 10:3
10:9
freezing
277:11
front 88:11
227:6
274:20
Fubo 4:8
fuboTV 1:3
full 130:17
134:11
135:22
136:5
137:16
269:4
274:14
276:13
277:3,10
278:10,23
278:23
279:7
fully 32:19
92:19
142:19
function
98:17
115:23
119:18
201:12
219:21
279:24
288:3
fundamental
54:4
261:18,25
funny 250:4
further
30:13
303:9

G

G 4:1
general 44:5
82:9
137:14
139:25
278:1
281:23
282:7,13
generally
23:9 24:14
35:11 48:3
64:12
112:22
117:7
150:19
167:23
168:15,24
170:13
172:17
173:13
237:2
252:19
260:12
generate
107:18
119:3,6
135:7
136:6
241:17
244:5
generated
22:6
107:24
112:8
115:3
124:12
generating
107:25
124:11
239:16
240:16
280:8
generation
149:25
generic
264:1
generous
293:7
genuinely
51:24
Germany 12:7
getting
109:7
124:24
217:9
235:2
247:9
give 21:23
58:11 69:3
70:3 90:13
117:13
126:13
128:3
211:5
227:12
231:11
given 14:6
31:9 32:4
32:6,8
38:17
46:19
119:7
127:6

158:22
204:18
241:7
255:1
256:2,3,7
276:15
gives 172:4
228:2
272:17
giving 14:5
glory 274:17
275:8
go 21:5 37:6
42:10
47:15
58:14
64:13 66:4
69:1,17
83:15 88:4
90:11 92:5
94:14
99:14
101:9,15
116:8,25
128:4
129:21
130:14
141:15
153:6,8
154:17,19
157:8
160:10
161:7
165:13
170:22
176:20,23
182:2
184:2
188:19
191:19
196:19
202:3
206:9
207:15,23
211:2
212:22
213:2,17
214:5
215:3,18
216:4
220:16
221:14,24
222:4
224:22
227:9
231:13
232:10
236:3
237:21
244:9
246:17
250:11
268:25
273:13,21
274:3,3,25
281:10,21
281:24
282:15,19
285:20
286:7
288:6
297:21
298:6,21
goal 9:16
118:18
119:16
126:16
127:6,8
God 54:4
235:25
goes 133:18
189:17
223:14
going 9:6
14:17
47:10
58:17 86:1
89:15
90:10
118:3,3,4
120:24
123:3
126:13,14
128:5,9
129:1
131:25
133:15
135:24
136:3,4
137:17,18
138:19,23
139:6
140:13,14
140:18,22
141:9
145:9
156:8
161:7
162:18
180:10,12
180:22
185:19,22
185:24
197:23
211:19
214:4,20
215:1
221:13
233:4,22
233:24
234:2
235:1,20
240:6,6
242:25
245:13
248:7
252:18
257:16
259:20,21
266:22
268:13
270:18
271:3
281:22
282:12
288:25
298:24
good 5:13
31:18
94:24 95:1
99:19
138:23
145:8,8
274:15,25
276:5
277:23
278:20
279:25
283:13
graduate
24:6,8,10
104:3,8
granularity
123:4
graphic
172:23
173:25
174:2,10
175:24
176:6,25
177:5
179:2,4,17
179:21
180:2
181:3,14
181:15,21
187:15,21
great 52:1
63:6
268:11
278:1
282:2
greater
197:7,13
198:22
greatest
276:21
greatly
158:24
group 62:17
62:21
72:21 73:2
73:16
148:25
149:5
150:4
groups
101:20
102:2
150:8
guaranteed
105:14
guess 6:22
6:23 7:22
7:22 20:13
53:3
123:13
124:24
129:20
135:19
179:24
219:13
225:10
263:17
264:19
gun 89:21
Gunner
103:13
guy 103:13
guys 15:23
16:3 39:3
52:4 53:9

H

half 15:25
99:14
128:1
135:18
243:23
handed 58:1
230:15
handing 8:7
41:25
167:12
235:4
258:18
280:6
292:4
handle 7:9
Hanft 2:20
hang 140:13
213:21
happen 181:5
186:15
211:7
happened
63:4 106:9
242:24
happening
223:9,11
224:8
253:19,20
272:21
happy 6:15
6:17 88:3
165:1
278:2
299:23
hard 45:8
116:12

168:23
hardware 71:14,14 73:18,18 76:8,9 107:19 108:12 124:5,14 124:25 125:5,6,7 125:13,17 125:20,24 125:25 144:6,7
HD 120:7 274:15 276:13,14 276:18 277:3 278:10 279:8,13 279:15,20
He'll 302:16
head 61:3 69:1 70:7 113:16 206:9
headaches 108:20
heading 262:12,17 294:19,23
health 284:23
hear 276:19
heard 10:2 38:1 99:13 99:20 100:3,15 139:20,24 140:1
hearing 157:3
held 4:14 63:9 145:11 298:25 300:2 302:6
help 13:20 48:22 78:9 202:7
hereinafter 44:11
high 114:25 115:10,16 116:24 118:20,21 119:1,9,12 119:17,24 120:3,9,11 120:16 197:3,6 277:21,25 278:24 279:25 293:24 294:11,24 295:8,17 295:20,22 297:10,15 298:13
high-qua... 276:24 278:9
higher 37:23 197:5 199:2,10 199:13 200:21 201:6 267:18 297:11 298:19
highest 294:15
highlighted 128:9
highligh... 110:9,10
highly 31:6
history 24:25 25:3 25:8,18,23 26:13,24 27:1,2,5,9 27:13 33:16 82:12 115:24
hold 153:5 156:6,6 235:16 281:14
home 205:7
honestly 262:2
host 51:12 51:15 212:1,25 213:5 215:12 249:20,21 249:23,24 249:25 250:1,3
hosting 51:4
Houh 15:13 18:6
Houh's 15:11 18:11,18
hour 14:2 15:25 58:18 99:15 197:23 248:8
hourly 14:1
hours 15:25 16:11 17:10 21:24
house 242:8 242:10,10
HTTP 55:7 56:12 93:22 94:10,21 95:11,24 96:14,25 97:3,10 98:25 99:6 153:12,14 153:19 154:2,12 154:14,16 154:25 155:12,18 155:25 157:14,20 158:14,16 158:22,24 232:24 237:12 284:20
HTTP-based 98:18
Hudson 2:25 4:12
huge 266:22
human 126:18
hundreds 88:14,20 89:2,4
Hurst 49:9 259:14,17 261:22 263:1,22 264:14 271:19
hypertech 155:25
hypothet... 36:24 138:5,7 174:5

I

i.e 134:17 142:4 164:10 284:11
Ian 2:2 4:23
IBM 73:9,15 73:16,17 73:20 74:6 74:8 75:13 76:10,11 76:17 79:6 92:20
IBM's 73:13
idea 52:25 95:18 96:14 97:2 134:6 179:20 247:21 270:3
ideas 52:4
identical 21:12 240:1,11 240:23 241:13 242:15
identifi... 57:25 60:25 77:8 83:6 110:8 145:24 165:15 166:1 201:16 250:10
identified 45:16 159:13
identify 155:17
igpaquet... 2:4
illustra... 216:9 251:24
image 151:19 151:20,23 151:25 205:21 206:25 275:6,16 279:19,23 291:13 292:2,19
images 151:12,15 151:18 152:5 163:4,9 164:14,21 165:5 188:7,9 201:22 202:4,7,9 202:18 205:13,24 207:5,8 208:9,16 275:3,13 289:11 291:4

292:15
293:2
immediate
53:10
immediately
51:25
161:14
162:14
impact
119:22
199:14
implement
110:3,19
121:3
122:16
124:15,20
125:11
139:19
208:24
implemen...
122:11
284:2
292:7
implemented
92:19
113:12
124:23
261:2
implemen...
121:18
208:14
implication
291:4,12
implied
215:7
implies
239:15
important
54:2
144:25
210:6
233:23
234:2
268:8,10
272:11,24
impress
51:17
impressed
50:21
51:11,25
52:6,10,15
52:24 53:4
53:13,16
53:17 54:3
54:7,17,21
55:7
150:14,22
151:3
153:14,19
272:5
275:8
276:12
277:2,18
278:10,16
278:21
279:7
284:19
impressive
278:19
imprison...
92:8
improve
181:21
improved
239:6,10
239:15
improvement
243:24
improves
263:20
In-House
2:18
inartfully
247:21
include 26:2
27:6,15
43:3 108:6
158:8
161:24
173:3,8,10
173:17
192:17
195:17,20
202:22
291:18
included
51:3 53:6
54:9,10,11
54:12,17
54:21
70:18
93:13 94:4
103:23
110:9
129:16,25
133:4
296:5
includes
25:8 171:7
171:13,21
188:22
189:2,4,4
189:7,13
190:6,17
190:18,20
190:24,25
191:1,2,11
191:14,16
191:23
192:2,10
192:11,20
192:21
193:4,5
194:12
196:10
226:15,17
229:23
230:6
including
46:25
134:23
154:6
238:14
incomplete
36:24
138:5
inconsis...
87:20 88:2
88:7
incorrect
68:15
increase
14:8,12,23
118:19
increased
14:13,21
14:22 15:2
increases
181:8
incredibly
145:2
242:6
253:21
254:12
273:20
independent
239:11
independ...
99:1,8
131:1,7
indicate
221:19
245:8
indicates
212:4,9
222:2
individual
15:16
76:24
165:8
174:15
237:10
239:12
269:4
272:19
275:13
industry
101:19
102:2
inexpensive
143:17,25
144:3,13
144:20
272:17
inference
291:6
information
75:17,18
80:4,12,19
81:18 82:1
82:6,16
92:4 106:7
107:2
142:14
173:14,15
261:17,24
262:8
285:13
informative
36:5
initial 13:4
151:2
initially
19:25
242:24
272:5
initiative
62:18
innovation
262:21
271:14,20
innovations
260:15,21
innovative
259:25
inserted
106:16,19
integrated
133:21
163:3,8,18
164:14,21
165:5
Intel 102:4
103:4,10
103:23
109:5
110:3,18
123:12,14
Intel's
105:7
108:5
111:22
124:15
125:10
intellig...
243:21
intended
295:8
intent 23:17
intents
108:13
inter-
132:11
133:5,8
interested
37:9
303:12
interface
121:2
122:15

123:8,16
123:18,20
123:23
124:1,2
284:9
internal
121:2
122:15
123:15,18
123:20,23
258:23
259:2
280:25
281:5
internally
92:19
Internat...
11:5,7
internet
62:23
66:21 67:1
67:23 68:7
68:22
69:25
70:24 71:4
71:17 72:1
72:8,14,22
78:23
105:17,19
110:15
120:6
143:20
144:15,22
155:24
167:23
169:1,12
203:9
239:17,21
240:3,13
241:5,11
244:22
253:16
281:24
282:7
284:10
interpret
288:23
interpreted
41:16
interrably
213:6
215:14
interrupt
31:15
212:25
215:12
interrupts
213:5
interstream
133:10,18
intrastream
132:11
133:5,8,20
introduce
4:17 43:19
44:2 45:2
168:12
187:6
introduced
64:9
introduc...
259:23
invalid 6:12
6:17,17
7:2,20,24
invalidate
36:20
37:18
79:15
160:5
invalida...
90:5
invalidity
29:20
30:14,24
31:14,22
32:11,23
37:11 62:9
78:6 86:5
86:21
146:17
invent 95:18
96:1,14
97:2
invented
52:5 53:9
259:24
260:5,10
272:7
invention
38:19
46:21
167:21
169:9
184:6
208:14,24
216:11
217:4
238:25
239:4
251:18
252:21,23
263:12,14
273:19
inventor
23:20,24
56:22
259:19
263:12
265:1
inventors
19:2
259:21
investig...
150:9
investig...
156:21,24
involve
68:17
involved
5:20,23
10:16 12:6
67:4 69:14
72:10
100:8
127:3
involvement
11:23 12:2
73:13
205:12
involves
7:19,21
127:13
IP42024-...
1:12
iPhone 243:6
243:8,13
IPR 8:1,4
9:11,20
18:7 29:22
61:5,11,15
62:3,6
77:15,20
78:2,10,14
78:15
79:13 84:9
84:15 85:1
85:10 87:8
87:15,22
90:14 93:7
94:7 146:2
146:14
152:22
154:18
156:12
159:22
160:11
IPR2024-...
1:9
IPR2024-...
1:10
IPR2024-...
1:11
IPR2024-...
1:13
IPRs 5:18,19
5:22,24
8:24,25
9:8 10:16
11:12
12:17
13:13,20
15:1 18:19
18:20
19:10,19
20:15,24
28:12,18
29:12,16
31:14,22
32:9,22
37:23 38:5
63:24 86:3
86:19 87:9
87:23
irrelevant
36:19
ISBN 113:24
114:5
ISDN 105:9
114:17
115:7
116:21
isolation
196:12
issue 5:18
8:24 9:7
9:10,20
13:22 44:7
49:24
82:10 87:9
118:8
119:2
159:16
249:3
issued 74:7
issues
119:23
203:10
284:4,10
ITC 13:1,22
14:9,13,21
14:22,24
15:2 38:23
39:9,14
156:21,24
157:3
ITC's 39:20
40:8,14
item 156:14
items 67:10
iterated
22:7

J

J 1:19
JAFFA 5:7
Jaffay 1:17
3:3 4:6
57:22 58:2
60:23
61:25
62:13
63:20 77:5
78:12 83:4
90:11,19
110:6,9,12
120:25
126:2
145:22,25
147:2

154:17
160:9
165:12,16
165:19,20
165:24
166:2
201:14,18
201:25
215:20
218:12
230:21
250:12
300:12
304:22
James 2:19
2:20
Jamie 2:18
5:3
jargon
106:15
joined 4:23
5:3
Journal 79:6
June 147:8

K

K 1:21 4:15
keep 96:18
118:17
234:25
236:5
284:9
keeping
119:15,20
keeps 217:6
KEVIN 1:17
3:3 5:7
304:22
key 148:10
271:13,20
kilobits
114:10
200:5,13
288:8,22
289:3
295:17,24
295:25
296:20
297:6
298:8
kind 39:3
56:8
103:15
134:4
144:2,4
276:10
Kingdom 12:7
knew 52:16
52:18
53:19
76:17 77:4
123:13
knock 252:18
know 11:20
15:21 17:1
17:23
18:24 20:3
20:4 23:24
25:12,23
26:7,16,18
27:3,3
28:3 30:5
31:11
33:25
34:16,24
35:1,23
36:25
39:25
47:17 50:3
53:1 57:1
59:17
66:10
68:25 69:2
76:24,25
81:23 82:2
83:21
88:22 90:7
91:1 93:8
98:12
100:6
108:22
116:21
118:18
119:16
121:9
123:7,19
138:20,21
139:23
140:1
144:6
147:14
156:25
157:12
158:5
160:15
163:10
164:24
166:9
173:18
180:23
185:8
188:16
195:1
200:10
202:9
205:6,15
205:18
206:7,13
207:2
211:23
218:25
219:3
220:6
224:14
227:21
231:9
234:1
236:4
238:12
242:19
243:13
244:4
245:12
251:5
252:17
253:6
255:8,10
256:20
257:9
261:6
262:2,17
263:6,17
263:19
264:10,11
264:21
265:9
267:7
268:10,22
269:8
272:18,19
272:20
273:15,16
274:2
276:15
279:21,23
279:24
280:25
281:2
286:10,12
289:7,17
290:2
291:19
293:9,24
Knowing
85:21
knowledge
22:19 92:3
254:1,21
255:23
256:1
known 10:13
65:9 67:24
68:7,22
69:25,25
70:24
71:17,18
72:1 74:24
75:3,6,21
95:16
129:9
132:17,22
132:24
134:23
142:15,20
148:5
158:13
159:3
263:10
264:6
284:14
285:19
286:6
knows 243:18
279:11

L

L-A-N 113:25
L-e-a-n-...
56:23
L.L.C 1:6
lab 104:11
labeled
68:12
Labs 103:5
LAN 113:25
114:1,12
114:14,17
115:7
language
43:18,23
43:24 44:1
168:12
187:5
216:20
225:2,10
226:13
230:10
231:25
249:16,24
LANs 119:8
large 164:11
larger 51:5
52:11
200:23
201:5,11
lasted 123:1
late 10:23
47:24 48:5
62:16,20
65:7 66:18
66:23 67:5
67:12,14
70:22,25
71:23 72:2
72:4
latency
126:18
127:11,20
270:24,25
284:11
285:1
launches
63:17,18
law 4:22
252:12
layer 105:20
108:21
laying 284:4
layman's
267:2

270:15
leader 65:4
180:18
Leading
301:13
leaning
56:20,22
56:22 57:4
57:6,8,11
57:13,16
57:19 58:3
58:9
learned
123:10,11
123:13
learning
53:20
59:22
leave 125:16
left 111:6
134:11
141:20
191:20
246:1
legal 25:11
26:18 27:3
27:23 28:6
28:10,16
29:4,11,15
252:16
length
279:14,16
let's 34:9
35:18,19
37:6 42:10
47:15
51:10
58:14
64:13
83:23
90:11
101:9,15
111:5
130:14
135:15
138:24,25
151:5
153:6
154:17,19
157:8
160:10
164:1,3
165:13,23
169:6
171:11
174:19
176:20
177:15,16
181:1
182:2
184:2
187:24
188:19
191:18,19
196:19
199:9
202:3
211:2
213:2,17
215:18,25
216:4
224:22,22
234:6,18
236:1,1
237:21,21
237:22
242:12,13
243:7
244:9
246:17
250:11,14
271:6
274:3
276:24
282:19
292:24
293:12,16
294:4,16
297:21
298:21
letter
156:15
level 205:8
levels 287:5
libraries
35:16
lies 264:14
265:3
life 261:19
262:1
light 46:22
liked 54:22
likelihood
173:22
limit 119:1
157:23
158:19
limitation
231:13,18
231:24
232:10,11
233:2
234:22
237:6
limited
96:21,23
140:5
147:23
187:19
limiting
45:3
168:14
line 99:14
177:1
186:20,23
187:1,24
187:25
188:2,5,5
227:12
238:22
251:4,10
251:20
253:18
304:4
lines 166:5
166:8,19
167:16,20
168:16
169:7
176:23
177:9,16
177:23
182:3,4
184:3
185:7
186:17
213:2,4
216:4
219:3
227:9,21
251:2,16
link 202:12
203:5
208:8,12
284:24
linked 203:3
list 9:1
89:9 154:5
156:4,10
212:9
listed 8:23
34:5,10,12
34:17
36:16
67:11 80:4
80:18
81:25 82:6
82:16
290:15
listen 62:22
205:6
lists 287:7
290:10
literally
53:25 54:2
136:11
191:17,19
literature
35:15
48:11,25
litigation
10:17,24
12:6,14
47:22
little 14:17
177:15
179:8
197:23
235:2
236:9
244:4
248:8
live 59:25
60:3 62:22
67:1,23
69:24
70:14,14
70:17,23
71:3,7,11
71:16,25
72:13 93:3
164:10
239:6,10
239:16,17
239:21
240:2
241:4,11
LLP 1:21 2:2
2:11 4:15
4:22 5:2
loads 114:13
loaned 73:15
73:20
locally
214:4
218:24
219:7,15
219:23
220:1
221:13
located
218:8,17
244:21
locations
244:22
locks 284:11
284:25
logic 248:2
271:8
long 15:23
16:10 22:2
22:2 89:9
89:11
122:22
123:4
147:19
148:21
194:7
200:19
longer
289:10
look 36:1,8
36:14 40:5
57:6 61:7
83:22
126:2
129:18
134:11
156:14
160:14

163:20
165:7
177:16
191:18
206:4
207:8
216:24
219:2
245:13
261:11,14
271:6
273:22
280:20
296:18
looked 74:17
94:12
234:16
275:5,16
280:16
looking
29:18 37:3
120:25
132:3
141:16
155:21
157:18
166:20
179:18
227:11
236:10
244:14
250:21
251:2
284:7
293:4
297:22
looks 8:25
212:23
245:24
looping
217:14
lose 270:5
lost 5:17
274:11
285:24
286:1
293:14
lot 52:7
88:17
125:21
130:8
140:5
268:14
276:11
lots 148:3
low 91:7,17
92:12
112:8
114:24
115:9,16
115:22
116:2,4,6
116:19,20
116:23
117:4,8,11
117:20,21
117:22,25
118:11,15
119:23
120:3,9,11
120:16
139:21
140:8,17
145:2
196:23
197:2
275:6,16
276:1
293:7,8,19
293:19,25
293:25
294:1,7,11
low-end
296:2,5
297:13,25
298:11
low-quality
276:23
277:1
278:8
279:6
lower 107:18
109:7,17
109:22
136:5,7
137:2
210:1,13
294:1,7,14
294:14,14
297:14,18
297:18,20
298:12,16
298:18
lowest 244:6
297:1,2
Lynn 2:18
5:3 15:20
302:16

M

M.H 79:10
machine
203:8
main 103:20
maintained
59:21
major 18:24
19:6,9,18
53:19
majority
178:12
making 81:15
160:19
161:8,12
210:12
254:7
269:4,13
269:22
284:19
291:6
managed 60:7
160:22
161:4,15
162:14
manager
249:24
managing
56:10
manipulate
75:8,22
124:9
manipulated
142:4
manipula...
143:2
manner
135:10
March 79:6
155:18
mark 57:22
60:22 77:5
83:3
145:21
165:11,13
165:23
201:13
237:25
259:14,17
marked 8:8
21:16 28:7
39:16 42:1
57:24 58:2
59:13
60:24 73:6
77:7 83:5
110:7
145:23
165:14,17
165:19,25
167:13
201:15
215:19
235:5
238:5
250:9,12
258:19
274:21
280:7
281:3
292:5
300:15,24
market 64:4
marketplace
272:22
masked
270:25
matched
239:22
materially
157:4
matter 1:18
6:13 10:10
16:13
25:13,16
26:6,10,15
26:18,22
27:3 34:21
35:4,5
44:5
137:14
286:11
290:2
matters
47:22 49:6
maximum
119:3,6
288:3,4
MBone 60:11
60:13,14
60:18
62:18,21
63:1,16
242:24,24
mean 6:8
22:1 26:6
29:24
31:15 37:1
37:13
39:23 40:1
44:3,18
51:24,24
51:25
52:16 55:1
56:6 61:8
61:19
66:13 74:1
80:8 81:4
81:8,10,19
84:19
89:14 95:7
105:13,22
107:5
108:8,9
112:13,16
113:2,7,9
115:14,18
119:19
121:7,17
122:3
123:22
124:18
131:11,22
136:1
139:6,25
144:9
151:2
157:5
158:2,6,9
165:8
168:13

180:7
184:16
185:5,10
185:19
191:13
193:13
196:3
207:2
210:6
217:13
224:5,15
225:10
237:14
240:18
242:19,23
263:7
264:19,23
268:12
276:10
279:25
285:7
288:18
289:8
293:22
295:21
meaning
31:16
38:18 41:8
41:18
42:23
46:20 58:8
130:7
214:3
221:12
means 25:3
31:4 44:17
45:2
107:17
109:21
112:23
113:3
131:8,10
144:5,9
153:13
200:22
216:23
219:23
220:1
223:13
246:8
267:18
271:2
meant 23:17
66:16
127:17,18
158:12
measured
152:4
measures
144:25
mechanism
154:12
mechanisms
99:6
media 1:3
4:8 51:5
52:11 55:6
66:16,24
66:24 67:3
67:5,8,13
67:15,22
68:3,5,8
68:16,18
68:18,20
69:14,21
69:23 70:2
70:8,13,18
70:23 71:2
71:9,10,15
71:19,21
71:22
72:11,12
74:7 76:16
76:18 91:4
91:6,16
92:11,18
93:12,22
94:3,9,20
95:2 97:14
98:23 99:4
99:20,23
99:25
100:1,3,7
100:13,15
100:18
101:6
104:12,24
105:21,22
106:8,20
106:23
107:1,4,5
108:6,25
108:25
109:16,22
110:4,14
110:19
111:23
122:4
128:24
129:6,12
129:16,25
130:8,12
130:25
131:3,8,22
132:12
133:5,9,13
143:25
153:14,24
160:21
167:6
173:22
199:9,12
243:10
258:24
259:24
260:10,22
261:2
263:2
271:15,20
271:22
272:1,10
273:18,23
282:24
283:6,14
283:19,22
285:13,20
286:7
294:20
media's
104:20
medium
114:24
115:9,16
116:24
120:3
279:5,19
280:4
meet 15:23
16:1
225:17
226:3
meeting
16:10
megabits
114:14
119:7,7,8
295:7,12
295:13,23
298:19
member 73:16
74:5
members 73:2
169:15
170:20
memory 94:14
94:16
293:5
mention
38:22 39:9
152:12,18
152:23
251:12
mentioned
142:7
merchandise
261:17,24
262:3
mere 268:3
message
161:1
205:9,11
209:7
messaging
149:16,21
met 16:4,6,8
method
128:23
216:9,14
216:15,17
216:18,21
217:2,7,10
217:12
239:5
method--
216:21
methods
127:22
128:18
MG 9:24 10:2
10:5,8,13
29:19
30:13,18
mid 62:16,20
mid-1990s
60:16
63:17
127:8
middle 286:1
midway 29:16
47:16,18
151:10
196:22
migrate
105:15
mile 240:21
241:25
Mill 2:12
millisec...
139:11
mind 55:2
145:3
minimal
66:17
126:18
127:10,20
minute 79:11
151:6
164:19
223:23
231:11
298:22
minutes
197:25
248:10
276:25
misleading
109:23
125:14
misrepre...
191:12
missed 64:17
89:21
missing 54:5
misspoke
23:16
misstates
39:2 40:16
41:10
69:12
203:24

228:14,17
mistake 37:20 39:7
mode 285:15 285:21 286:8,14 289:3,13 289:21 290:5,23 291:17,19 291:23,25 292:11,14 292:17 293:1,14 293:18,25 294:6 298:4
modem 91:7 91:17 92:13
modifica... 110:18
modifica... 124:20
modified 111:22 143:23
modify 103:5 103:23 104:12,20 108:5 110:2 121:16 124:15 125:10 149:25 206:13 249:25
modifying 105:7 109:5
module 217:21 218:1,4,8 218:16,20 218:23 219:1,8,10 219:14,22 220:3
monitor 129:3,10 180:10,19
monitoring 53:24 54:12
Moore 1:19 1:24 4:11 303:2,17
morning 5:13
motion 136:9 136:22 137:2,8,15 137:22,23 139:22 140:2,3,5 140:5,9,17 175:6 276:20 294:1,8
motivated 112:18
move 36:21 96:9 97:16 98:1 237:21 258:23,24 259:25 260:10,21 260:22 261:1,3,5 263:1 267:8,9,25 268:15,17 272:2 280:8 289:20 291:18,22 291:25 292:5,6,10 292:14,17 292:25,25 293:12,13 293:16,17 294:4,5,20 294:24 295:15 296:9 297:24
Move's 264:14 268:9 271:20 272:11 274:11 281:8 285:4,18 286:5 287:12
moving 163:4 163:9 164:14,21 165:5
MPEG-DASH 51:21
MSM.com 290:10
multi-bid 50:23
multi-bit 97:8
multimedia 65:1 126:17 127:3,5,14 127:17 128:19
multiple 52:22 53:22 54:10 56:11 165:18 171:6,12 171:20,25 178:15,17 178:23 227:1 232:18 233:8,12 234:2 237:19,20 239:6,10 239:18,20 240:1,12 241:3,10 247:7,14 247:19 248:2 263:3,23 264:7,15 265:3 266:14,18 266:21 267:3,10 267:11,12 267:12,13 267:14,21 268:4,8,13 268:14,18 269:13,19 269:22,22 271:2
multitask 60:11,17

N

N 4:1
name 4:10,21 9:25 10:13 12:23 15:22,22 24:5 30:19 76:14,19 76:19 103:21 107:12
named 19:2 23:20,23 24:12 76:22 103:13 260:5
names 15:17 103:10
Nationwide 4:13
nearly 108:10 116:10 149:2,7
necessarily 44:18 100:20 115:14 173:19
Nee 103:21
need 124:14 125:12,15 125:19,23 199:8 253:23 254:16 271:15,22 272:10
needs 22:22 23:14
neighbor 200:11,15
network 60:14 63:25 64:2 64:9,25 66:19,24 68:12,19 70:20,21 71:24 72:6 72:12 75:11,18 75:25 95:14 100:13,23 106:17,19 115:24 117:5 118:3 151:1 157:21,23 157:24 158:17,19 158:20 164:12 167:24 168:1 169:3,12 169:21 170:2,9 181:7,21 184:8,12 184:17 185:5,14 185:17 186:3,7,7 186:11,13 188:20 191:21 201:12 212:10 227:17 231:20 232:13

233:5
237:8
239:12
240:8
241:1,23
241:25
243:18,19
243:22
258:24
261:1
262:6,7
276:16
277:14
281:24
282:7
287:6
292:7
295:9,16
295:18,22
Network's
65:8,17,22
66:1
260:22
283:10
networking
60:15 77:4
119:18
233:20
networks
74:15
147:19
148:8,21
149:2
184:19
259:25
260:10
261:18,25
267:8
294:24
295:20
never 10:8
12:13 19:6
21:1 50:15
109:14
110:1
139:24
200:9
272:20
278:22
new 2:3,3
144:6
205:5
259:24
news 63:12
287:9,19
newsworthy
63:14
Newton 24:12
next-door
200:10
nice 55:1
nineties
119:4
Nolan 15:22
non-high...
128:6
non-limi...
43:13
non-prov...
24:19,22
25:8,16,22
26:5,11
nonlimiting
43:17,22
44:3 169:3
187:8
nonpatent
56:16
nonprogr...
97:3
normally
106:18
North 59:20
59:20
73:10 74:8
103:17,24
Northern
11:14
Notary 1:20
304:25
note 47:21
135:21
197:4,6
notice 1:18
notion
247:24
250:23
293:5
novel 266:12
266:15
NTSC 293:9
number 47:7
47:11
48:12 49:8
61:6 64:18
74:10
77:16 78:8
152:5
156:4,10
156:14,18
211:8,9
numbers
227:12
NW 1:22 4:15

O

O 4:1
oath 4:20
Object 14:14
28:22
40:15 45:4
46:12
52:13
54:14
55:19 58:5
72:15 75:1
77:9 81:22
89:6,23
95:20 97:5
192:14
202:24
224:13
242:2
254:4
265:6
266:9
270:7
271:24
272:13
objection
7:3 13:7
13:15
25:10,19
26:14
33:18
34:19 35:2
36:23 39:1
41:9 45:25
61:17
68:23 69:7
69:10
77:22
79:16
81:11
82:17 83:8
87:1,24
95:4 109:9
110:21
115:11
120:13
121:20
122:23
130:2
137:9
138:4,13
140:10
141:2
146:5
147:25
159:23
174:12
175:11
180:3
184:20
187:9
194:15
197:15
200:24
201:7
203:23
206:5,17
207:9
209:16
210:3,22
218:9
222:12
223:6
224:3
225:19
226:5,23
228:9,12
229:5,8,10
241:14
242:17
252:15
254:24
255:13
256:12,23
257:12,22
258:15
268:20
273:4,7
275:9,19
277:4
278:12
279:9
285:22
286:9
289:15,23
291:1
298:14
301:12
objects
261:16,23
262:6
obvious
139:18
obviously
120:17
occasion
47:23
48:10
occurred
89:13
occurring
269:18
October 1:16
4:4 301:23
offered
46:15 60:3
60:6
102:24
120:22
offering
41:12
office 1:1
26:1 74:2
80:13
offices 1:21
Ogden 160:20
160:25
161:5,9,10
161:10,13
161:23
162:9,13
162:17,18
162:20,23
163:1,12
163:12
167:14

168:3,6,8
169:5,18
169:24
170:6,14
170:19
171:6,12
171:19,24
172:4,8,13
172:15,19
172:21
173:11,20
173:21
174:6,8,20
175:1,5,9
175:24
176:1,4,8
176:14,16
176:19,20
177:4,10
177:12
178:6,19
178:21
179:10,10
179:20,25
180:7,14
180:25
181:6,11
181:12,17
181:22
182:1,19
183:6,16
183:17
184:1,25
186:5,9,18
187:1,19
188:12
191:12,15
191:17,18
192:6
193:14,17
196:19
197:17
198:14
199:15
200:22
201:4,10
210:14
211:2,10
211:12,17
211:25
213:13,15
214:21
227:6,24
228:6,14
229:2,21
229:25
230:4
245:15,17
249:20,25
250:3
Ogden's 160:21
161:14
162:14
178:25
187:13
208:14,24
249:2
oh 53:20
54:4
152:16
222:21
235:25
236:5
290:17
okay 7:17
8:20 9:8
21:23 23:3
27:21 30:2
31:19
38:15
42:12
47:12,15
49:21,22
58:15,25
59:14 62:2
64:17 66:8
66:12 68:5
71:15 73:5
78:15
80:17
83:17
90:15,20
91:3 92:1
93:11
97:14
98:10,13
98:15
99:17
101:10,16
110:11
125:10
127:24
128:16
130:14,16
134:10
138:19,24
140:22
141:12,18
147:3,13
147:16
151:5,7,9
153:3,10
154:23
155:5,9
157:11,13
159:8
160:13,18
161:18
162:4,12
164:5
165:23
166:11
167:19
171:1,3,17
176:24
177:8,15
177:18,18
182:25
184:2,4
186:16
188:1,4,14
188:18
191:19,21
192:6
196:20
197:1
198:1
201:21
202:3
209:11
211:4,15
211:24
214:11
215:18,21
216:6
217:19,24
224:25
227:14
230:4
231:8,16
236:1,3
244:13
246:18
247:10
248:25
250:13
251:6,8
253:4,7,9
258:20
261:13
262:19,24
269:2
274:5
282:4,22
286:2,20
287:18
288:9,25
293:12,15
294:18
299:16,17
old 175:4,7
249:17
267:5
omitted 245:9
on-the-fly 121:3,7,13
121:18
122:2,16
124:16
125:11
once 10:13
164:25
259:9
260:10
280:19
one- 111:23
one-dime... 130:23
142:2
143:1
one-frame 138:12
one-size... 118:6
one-thir... 139:9
ones 13:3
online 146:1
onset 47:17
47:20
48:18
open 270:4
open-ended 43:18,24
44:1
168:11
187:5
operate 113:19,24
114:16
operated 115:6
285:6,8
operating 72:6 127:7
operation 66:19
113:25,25
114:1
115:8
operations 114:17
270:18
opine 43:12
87:14
opined 163:15
opinion 34:11 41:6
41:12
42:21
43:21,22
44:16
46:18 85:6
85:18,22
88:23
97:22
116:6
120:21
163:7,16
163:24,25
164:19
168:6,10
175:23
176:4,16
177:14
186:19
218:12

225:8
226:20
230:9
234:12
236:20,21
247:3
249:11,19
263:5
264:17
opinions
22:13
28:12
29:13
39:15,19
40:12
43:17
45:18 46:3
46:14
120:22
301:6,8
opposed 5:24
6:4
options
44:21
order 125:2
178:2,9
207:22
302:1
ordinary
38:18 41:8
41:18
42:23 45:6
46:20
53:11 95:2
170:4
174:9
232:21
233:11
252:22
253:22
254:2,12
254:22
255:2,24
256:3,6,19
257:1,24
258:7
264:20
272:2
orient
236:11
origin 52:7
263:4,24
264:8,16
265:4
original
50:19
294:3
originally
112:17
outcome
303:12
output
180:12
outside
10:15
overhead
154:6
233:21
237:18
overlay
60:14
overseas
12:6,10,14
overview
90:23
159:10
258:24
281:9
292:6
overwrite
234:10
owner 1:7
2:15 5:2,9
5:24 6:1,4
6:14,16
8:11,15
16:17 42:4
86:4,20
146:3
owner's
274:24
owners 6:20
7:10

P

P 4:1
p.m 145:14
145:16
198:4,5,6
198:8
248:14,15
248:17
298:24
299:2,3,5
300:5,6,7
300:9
301:23
302:19
package 53:8
53:18,25
54:3,8,8
54:21
74:15
packaging
132:10,13
132:19
133:1
packet
100:15,17
100:18,20
101:8
105:3
131:2,21
132:8,18
132:25
133:18
134:8,18
135:9
143:24
284:11,25
packets
100:23,24
101:1
132:1
133:16
134:1,2
135:11,12
262:7
page 2:12
3:2,6
22:25
27:18,22
33:21
59:12
61:24
64:13,18
64:19
78:12
83:16,16
83:21,23
85:17,20
91:24
111:5
112:1
120:25
126:1
130:14,17
134:10
141:15,21
143:8,11
155:7
201:18
202:3,22
204:23
206:4,14
207:20
208:6
238:19
259:10,22
261:12
262:11
268:25
271:6
275:1,2,3
275:16
279:20
280:20
281:10
282:20
286:18,21
287:7,22
294:16
296:19
298:7
304:4
pages 83:22
201:23
202:4
238:14
Palo 2:13
242:9
paper 111:1
112:11,16
113:17
114:3,21
121:23
122:20
134:24
280:25
papers 72:24
73:1
Paquette 2:2
4:24
121:20
187:9
222:12
265:6
302:8
paradigm
55:4 56:10
paragraph
8:19,23
9:2 28:2
29:18 30:3
30:4,7,12
31:10
33:10 37:6
38:12,16
38:22 39:9
39:13
40:23 41:1
41:2,24
42:10,13
42:16 43:1
44:8 45:15
47:8,14,16
49:5 50:18
55:4,13
58:14
62:12 66:4
66:9,14
67:7 68:14
73:5,8
78:17,17
78:21 80:2
80:24
90:11,18
90:25 93:6
93:8 98:7
98:11
101:15,17
102:6
103:3
104:10
120:24
121:14
126:2,9,11
126:15,23
127:21,23
128:1,5

129:2
130:17
134:11,15
141:19
147:1,6,11
147:13
150:3
151:6,10
152:12,18
152:21,25
153:1,5,9
153:12
154:19
155:2,7,8
155:10,11
155:21
156:2,4,10
157:8,19
159:6,9,13
160:14,15
160:20
161:2,8,12
162:5,7
164:3,4
165:9
171:2,4
172:4
176:13,17
177:11
186:19
224:22,24
225:1
238:21,24
244:14,16
245:2
246:17,20
248:19,23
249:1,19
260:4,14
261:11
262:16
269:4,7
271:7
274:8
281:22,23
282:5,12
282:13,19
282:20,21
283:5
284:7
285:25
296:1,14
297:22,24
paragraphs
45:11
parallel
54:23
263:9,19
265:16
267:14
269:19,23
270:1,19
parallelism
270:18
parallel...
54:24
parameters
150:1
paraphra...
104:15
170:12
park 252:19
parse 108:17
179:7
part 25:17
26:12,23
27:2,9
35:19
36:17
43:21
47:21 49:5
53:7 62:17
65:18 66:2
68:13
80:10
103:8,22
106:24
107:23
111:21
151:4
161:2,17
161:18,22
162:16,22
162:23
186:18
190:5
199:19
213:15
217:12
219:22
220:11
222:24
239:19
272:4
277:23
284:16
287:12
288:12,14
particip...
113:7
126:19
particip...
62:17
particular
40:21
50:22 51:7
53:4 54:1
55:6 70:9
73:18
88:25
95:22 97:8
101:25
104:23
105:10
120:6
123:5
130:5
131:14
132:12
134:25
161:5
175:5,6
237:17
257:2
266:15
279:13
particul...
37:9 51:11
52:10
157:20
158:14
parties 35:8
303:10,11
partition
100:23,25
131:24
132:1
267:20
parts 53:12
241:1
Pass 299:10
301:15
passage
168:9
251:23
252:10
patent 1:1,1
1:7,9,10
1:11,12,13
2:15 3:8
3:11,14,15
3:16,17
5:2,9,24
6:1,4,7,12
6:14,15,16
6:16,20
7:2,10,24
8:5,11,15
9:23 12:7
16:17 17:5
17:6,21
24:2,2,4,9
24:10,19
25:8,9,17
26:1,11,20
26:23 32:2
33:2,15
34:2,6,9
34:11,12
34:18 35:9
35:21,25
36:4,6,16
36:17,18
36:19,20
36:22
37:16
41:14 42:4
42:7 43:7
43:11 44:9
45:17 47:4
47:11,14
47:22
48:17 49:8
49:19,20
49:23 50:2
50:6,9,10
50:15,21
51:16 52:7
52:25 53:1
53:5 54:8
54:20 55:7
55:8,13,14
55:17,24
56:3,3,14
61:5,15
62:9 66:7
74:7,10,14
75:13,16
75:16,20
77:16 78:6
78:8 79:15
80:5,11,11
80:13,15
80:20 82:5
82:8,20,23
83:1,12,16
83:25 84:4
84:6,18
85:4,13,17
85:20,22
86:4,7,20
86:23
88:11,16
88:21,25
89:1,1,16
89:20 90:4
90:9 146:3
146:17,20
147:7,20
148:22
149:3,8,13
150:15
153:8
155:17
156:17
159:14,16
159:17,18
159:20,22
160:1,4,5
160:7,12
162:11
163:17
164:7,8
165:20
166:2
170:25
202:1
210:8
215:20,23
216:2

218:25
225:3
226:21
230:10,18
230:19,22
230:24
231:2,7
232:1,4
234:4,13
235:9,12
235:13,24
236:7,11
236:13
237:3,22
244:17
245:17,19
245:21
246:4
247:2
250:11
251:18
252:1,7,12
253:3
259:19
274:24
300:14,19
patent's
9:18,19
25:17
26:12,23
27:6,15
51:12
52:10
patenting
24:15
patents 6:10
7:19 8:22
8:24 9:1,3
9:3,7,8,10
9:13,20
13:21,21
15:10
17:15,18
18:2 19:3
21:11
23:21,23
24:5,6
25:4 27:5
27:14
36:21 46:7
46:11,25
47:1,1
48:12 49:1
49:2,7,8
49:14,17
49:24 50:3
50:16 52:3
56:13
65:19,20
89:9 97:12
120:2
150:14,22
153:15,20
154:11
163:2,3,8
163:12,22
164:20
165:10,18
165:18
166:13
167:3,7
225:8,24
226:8
230:25
231:3
272:6,6
284:15,18
285:6
path 149:18
293:8
Pause 171:16
peer 106:6
peer-to-...
142:10
people 63:5
65:9
103:10
116:18
117:21
140:1,4
152:7
158:5
242:22
280:1
perceive
137:15,15
perceived
244:6
percent 6:20
6:21,25
7:10,10,19
perfect
233:14
302:13
perform
220:23
221:7
222:9,20
223:3,17
performance
75:17
110:14
129:4,11
184:12,18
263:20
264:3
287:5
performed
156:12
213:7
215:14
221:2,3
222:24
289:20
performs
219:1,17
219:19
220:9
period 49:10
51:20
periodic
126:18
127:10,19
periods
119:14
278:24
permitted
58:24
persistent
232:24,24
233:7,16
233:17
234:4,7,11
235:15
237:4,12
237:12,13
237:14
person 12:22
15:21 16:1
38:18 41:6
41:17
42:21 43:2
43:25
44:25 45:6
46:20
56:24
65:12,16
117:3,11
118:10
119:11
120:1,8
170:3
174:8,16
183:5
196:5,15
208:13,23
209:12,24
232:21
233:1,3,10
237:2
252:22
253:21
254:2,12
254:22
255:2,7,10
255:24
256:2,6,19
256:25
257:9,23
258:7
274:14
personal 6:3
personally
36:2
Peter 103:21
petitioner
1:4 2:5,9
4:25 5:25
6:2,5,14
7:1 8:2
30:23 62:5
78:2
146:13
Petition...
37:22
petitioners
6:21 7:11
petitions
8:1 18:7
Philip 2:7
4:21
phon 103:21
213:6
phrase 33:11
37:10
139:25
177:4
185:4
225:11
physically
205:18
pick 164:1
picture
199:1
276:21
piece 76:8
106:15
pieces 52:20
261:17,24
262:8
pioneer 65:1
pipeline
133:13,21
133:22
pipelining
269:12,18
269:21,25
270:12,14
270:16,17
271:2
place 177:4
225:4
231:19
232:4,25
234:20
237:9
243:25
303:4,5
placed
226:11
places
243:16
251:10
plain 38:18
41:7,18
42:22
46:20
play 203:7
203:11
play-out

135:24
136:2
player 64:10
64:23 65:8
65:14,18
65:23 66:2
71:2,7,9
261:3,5
268:15,17
270:21,22
272:19
283:10
289:9
291:18,25
292:14,18
292:25,25
293:12,14
293:16,17
294:4,5
297:24
player's
292:11
296:10
players 64:4
64:5 65:1
66:24
68:18
70:23
72:12
242:23
playlist
43:4,8,12
43:14
44:13,18
253:25
255:12,19
255:23
256:10,21
257:11,17
257:20
258:11,12
playlists
43:18,23
please 4:17
21:5 22:25
27:18 30:2
30:4 31:10
47:8 59:12
78:18 93:7
126:1
127:21,25
128:1
147:1
171:2
188:11
211:12
231:6
236:20
262:11
281:21
plural 51:14
178:16,20
plurality
216:10,18
216:22
217:8
244:21
point 36:13
81:15
106:25
107:12
109:12
110:25
115:24
139:4
142:11,12
162:17
182:1
202:18,19
202:20
222:17
248:5
254:20
264:23
266:17
point-to...
105:13
106:1,2,25
pointed
237:7
pointing
193:17
points
106:10
108:2
113:4
142:11
143:19
144:15,22
poor 277:13
pop 240:21
POPR 8:16
16:14,22
17:7 21:7
21:19,21
86:12,14
87:4
POPRs 21:11
popular
242:22
POR 16:18,20
17:8 42:5
66:6
101:12
153:8
170:25
202:1,4,5
204:24
224:24
244:12
274:20
275:1
301:11
portion
128:10
167:22,24
168:25
169:2
176:15
177:10
188:23
189:5,8,9
190:4,6,17
190:19,20
190:21,25
191:2,11
191:14,16
191:24
192:3,4,5
192:11,12
192:20,22
192:23
193:4,6,7
193:10,20
193:21,24
193:25
194:7,9,13
194:13,20
194:21,24
194:24
195:21,22
196:9,9
203:19
204:3,4,8
204:8
207:17
225:7
247:1
portions
128:7
169:10,19
169:25
170:7
189:18
190:5
192:18
194:3
195:4,13
199:17,24
204:20
252:1,7
265:20
277:20,24
position
82:14
87:22,22
positions
87:9
possible
9:17 89:19
90:3,7
112:20
173:16
266:18
302:11
possibly
52:7 292:2
292:10,19
potentially
228:25
PowerPoint
138:21
180:21
202:12
practical
271:14
practice
48:24
254:18,20
255:4
256:4,8
257:2,25
258:8
295:2
practiced
126:25
pre-reco...
164:11
precise
158:10
precision
57:9
predate
154:11
predated
53:20
predecessor
102:12
preferably
155:24,25
preference
6:3
preliminary
8:12,16
300:23
301:1,3,9
premise
276:17
preparation
17:14,21
18:10
19:23
286:23
prepare 15:7
preparing
17:10
preponde...
29:22
300:21
301:10
present 2:16
127:9
167:21
169:9
184:6
209:22
212:6
216:11
238:25
251:18

presenta...
51:6 52:12
127:3,14
167:22
169:1,11
169:14,15
169:19
170:1,19
170:20
171:7,13
171:20
172:1,13
172:23
173:2,8
174:21
175:2,10
175:19,23
176:2,5,6
176:14
178:2,9,15
178:25
179:1,11
179:13,14
179:16
180:14,16
181:16
182:11,16
183:3,16
183:21
185:14,16
186:6,10
186:12
188:6,20
189:25,25
190:11,11
190:14,24
191:1,22
192:8
195:18
197:4,7,8
197:12,14
198:22,24
199:6
200:23
201:5
203:18
206:1,2
207:6,7
212:1,5,8
212:17
213:23
214:8,13
214:17
227:25
228:3,7,24
229:3,18
229:23
230:3,7
presenta...
172:19
175:14
presented
182:14
213:8
215:15
220:25
221:8
293:19
294:7
presenter
180:10
presenting
180:11
preset
113:19
114:16,22
115:6
presumably
267:18
presumed
33:6 86:7
86:23
Presumption
29:9
pretty
135:24
162:8
243:2
268:6
279:16
prevent
126:17
previous
162:1
223:22
235:8
237:11
previously
8:8 38:23
39:10 42:1
49:7
165:16
167:13
203:16
215:19
235:4
258:18
280:7
292:4,16
PRI 114:8
primarily
16:19 24:8
130:24
284:3
primary
127:22
128:18
principles
27:24 28:6
28:11,17
29:4
147:17
148:19
printer
279:24
prior 15:13
22:9 28:19
28:21,25
29:3,5
32:9 33:7
35:7,12,19
36:16,18
36:18,22
49:6 50:8
50:14 53:1
63:23
79:14 80:3
80:14 86:8
86:24
97:11
125:16
159:10,21
225:16,21
226:2,7
267:8
284:15
285:6,18
286:5
priority
147:7
149:3,8,12
Privileged
13:8
probable
31:6
probably
5:21 6:1,2
6:23 18:8
36:2,14
114:13,14
137:15
139:18
158:4,5,11
276:6,15
277:22
problem
51:23
236:8
284:14
problems
150:5
158:25
281:23
282:7,9
proceed
31:20
proceedings
1:23 9:11
9:21 25:25
302:18
303:4,5,7
process
24:15
122:22
142:2
224:1,11
processes
143:2
147:17
148:19
producers
239:5
product
102:7
105:9
125:6
186:7
profile
293:6
295:2
296:10,15
297:6,11
297:14,15
297:25
298:1,3,12
298:13
profiles
294:20
295:6
296:2,5,6
297:2
program
275:22,23
276:3
279:16
programming
62:22
279:14
progression
92:14
progressive
95:8,25
96:3,12,16
96:19,21
96:25
97:23
203:14
project
51:20 67:9
67:14 68:2
70:8 73:19
105:9
123:1
125:16
projects
24:7 70:13
153:24
proof 37:22
properties
265:13
proporti...
197:21
proposed 7:1
prosecution
24:25 25:3
25:7,18
26:12,24
27:5,13
32:1 33:2
33:16 80:5

80:10,19
81:1,10,21
82:8,22
84:11
85:24
89:12 90:9
ProShare
102:8,11
102:12,20
102:24
103:5,23
104:13,21
105:1,7,8
105:9,16
106:1,20
108:6
109:5
110:3,18
111:22
112:2,7,20
113:5,8,11
113:13,18
113:23
114:15
115:3,5,14
115:21
116:21
121:16
122:15
123:9,16
123:23
124:15
125:2,6,10
143:23
144:3,16
145:6
protocol
95:11 99:7
105:21
108:21
155:13,19
155:24,25
157:16
282:14
283:9
284:8
289:2
protocols
66:25
68:13,19
70:21
71:24
72:12
283:12
287:4,5
prove 37:11
provide
50:10
143:18,24
144:14,21
169:23
171:4
184:6
205:20
241:20
provided
28:8 30:1
44:3 49:1
50:12
95:13 99:6
168:13
169:11
217:21
218:1,4
290:13
provides
281:9
proving
29:20
30:14,23
31:14,22
32:11,23
86:5,21
provisional
24:22 26:4
26:20,22
26:25 27:7
27:8,15
pseudo-n...
134:6
PTO 25:6
32:18
81:24
ptsheng@...
2:9
public 1:20
261:9
304:25
publicly
71:8 76:7
261:5,7
published
79:6
134:24
publishing
148:25
280:9
pull 224:22
248:4
267:13
pulled 146:1
punishable
92:7
pure 53:23
54:11
161:23
purpose
100:10
119:22,22
purposes
39:15
45:18 46:2
108:13
300:19
pursuant
1:18
pushing
250:5
put 63:20
90:10
101:8
105:1,18
124:3,7
133:16
144:24
150:12
174:15
237:22
240:20
243:21
277:16

Q

qualific...
76:4
qualific...
23:5,11,14
quality 63:6
197:8,14
197:20
198:23
199:6,11
199:14
267:19
274:15
275:6,16
275:24
276:1,2,13
276:15,18
276:23
277:3,12
277:13,22
277:25
278:11,20
278:24
279:5,8,19
279:20
280:1,4
297:14
298:12,16
298:18
quantify
140:2
quantita...
117:13
139:6
quantum
260:6,11
260:15
262:12
263:15
271:14
question
13:10 26:9
27:11
34:25 39:5
65:21
69:18
84:24
85:25
86:18,18
90:1
116:17
117:24
129:20
148:15
152:17
157:2
171:18
175:17
179:7,24
196:12
199:4
201:2
207:23
214:11
216:25
217:1
218:14
219:13
221:4,22
223:22
224:15
235:7
243:13,14
243:23
247:10
254:7
264:5
273:11
275:21
276:17
281:22
282:1,12
282:16
286:3
290:11
294:3
questions
57:20
128:9
141:11
143:7
211:19
222:23
quickly 9:17
QuickTime
287:8,18
quite 48:8
74:17 88:6
88:17
141:9
quote 44:9
91:10,11
91:11
171:5,5
244:17
274:9
quotes
225:15

245:3,4
quoting
91:12
225:9,14
225:14

R

R 2:18 4:1
race 138:23
138:24
139:1
140:20,23
140:23
141:1,5,7
292:24
293:2,13
293:17,20
294:5,8
ran 290:3
rate 14:1,3
14:21,22
14:23 15:1
15:2,4,5
50:23 51:7
97:8 100:1
100:3,8,12
100:15,17
100:18,21
105:5
107:5,7,8
107:10,13
107:16
108:1,14
109:6,7,13
109:17,22
109:25
113:24
114:4,12
114:23,24
114:24,25
114:25
115:1,8,9
115:9,10
115:10,10
115:18,22
116:2,4,7
116:19,20
117:4,8,11
117:20,22
117:23,25
118:11,15
118:20,21
119:9,13
119:24,24
120:3,3,4
120:11,11
121:4,4,8
121:8,19
121:19
122:3,4,8
122:9,9,17
122:17
124:16,17
125:12,12
129:16,17
130:1,4,6
130:25
131:8,8,12
131:16,17
131:18,19
131:21
132:8,18
132:25
134:18,19
134:19
135:1,4,6
135:8,9,9
135:11,13
135:17
136:5,6,7
136:9,14
136:19
137:5,16
138:1
139:2
140:17,24
142:4
143:2,18
143:24,25
144:23
145:4
149:22,24
150:1
152:10
185:15,17
186:11,13
196:24
197:3,6
199:10,13
199:20,23
200:22
201:6
209:6
210:2,13
240:17
241:5,12
243:11,19
285:14
287:16
288:2,4,19
293:19
294:1,7,8
294:15
296:20
297:1,6,18
298:7
rates 14:8
14:12
52:22
56:12
74:24
109:3,4
112:8
113:20
114:16,23
115:3,7,19
117:7
131:2,2
132:14
137:2
150:24
189:20
193:11
195:6,9,14
196:15,18
198:18,19
199:17
204:22
239:13,22
240:4,14
240:25
242:16
293:8
294:12
ratio 295:2
ratios
293:23
295:1
reach 243:4
reaction
55:22
read 17:21
17:23 23:8
30:16
34:17
46:22
51:25
59:16 66:9
69:19
72:17
74:18
90:25 93:7
94:14,17
94:17
98:11,15
126:13,14
126:23
127:25
128:1,4,5
128:8,12
129:1
130:21
131:6
132:15
134:16
141:23
144:9
146:24
147:13
148:15
154:24
160:14,18
166:8,11
166:23
169:6,7,16
171:15
177:2
182:8
187:24
188:15
213:4
214:10
216:7
219:6
227:20
231:16,18
232:11,22
238:10
247:8
251:4,8
253:5
261:15
262:4,16
262:24
264:19
269:7,11
269:24
271:11
281:25
282:4,15
282:18
284:21
285:25
reading 17:2
104:16
154:20
217:21
218:11
219:5
237:3
281:4
290:17
reads 96:25
ready 66:12
211:24
real 63:24
64:2,7,9,9
64:22,25
65:8,13,17
65:22 66:1
66:13,15
66:20 72:7
107:21
128:19
147:18
148:7,9,10
148:20
149:1,6,17
150:9
154:25
155:12,19
157:15
172:10,16
172:20
174:21
175:8,10
176:10,11
187:14,20
283:10
293:15

realizing 270:17
really 6:6 6:13 21:14 21:19 22:2 52:1 53:8 68:11 75:15,19 80:21 81:6 91:21,22 94:16 111:1 115:2,18 127:18 137:3 148:9 160:8 162:24 169:5,23 228:21,22 233:6 273:15 274:1 279:12 289:7 293:7,19 294:7
reask 39:5 152:17 223:1
reason 21:13 30:19 33:5 34:6 42:8 58:4 74:20 114:20 139:2 151:2 217:6 251:14 284:16 294:9 304:6,8,10 304:12,14 304:16,18 304:20
reasonable 38:2,5 137:2
reasons 107:20 150:21 154:5 304:3
rebranded 30:19
rebuffer... 277:12
recall 10:25 11:15,19 12:23 13:2 13:6,14,16 18:15,17 18:21 21:19 22:2 22:11 24:21 25:21 40:20 47:7 48:15,23 50:12,21 57:9,13,19 61:10 62:10,25 63:12,14 63:16,19 64:11 71:4 71:5 75:15 75:20 76:21 77:19,24 78:8,9 79:18,20 79:20,24 80:22 81:6 81:15 82:21 83:1 83:2 84:13 84:20 85:7 87:15,16 90:8 91:21 103:20 108:8,11 110:24 112:10,19 113:5,11 113:13,15 114:5,6 115:2,15 115:19 116:3,9,10 117:7 120:23 121:9,12 121:23 122:5,11 122:18 123:7 124:21 146:11,20 150:18 153:25 154:14 156:21 158:3 160:8 163:22 176:3,9 178:20 181:10,17 181:24 184:24 198:15 201:9 207:13 240:5 245:14 249:15 261:7,10 283:17,17 283:21 286:21 300:12,22 301:4
recalled 79:11
recalling 122:7 178:21
recalls 250:23
receive 93:15 109:12,16 109:19,22 232:12,18 233:9 243:10 253:11,16
received 135:12 149:17 221:25
receiver 106:11 109:6,16 134:3 141:25 142:7,12 142:12,17 142:21
receives 215:4 236:16
receiving 109:21 237:7
Recess 59:4 145:13 198:5 248:14 299:2 300:6
recipient 106:13 149:19
recite 163:23
recites 236:13,15 244:20 247:6,12 255:18
reciting 256:15
recognize 11:16 61:2 61:20 76:14,19 77:12 257:14 258:21
recognized 64:25 65:4
recollec... 13:18,19 19:8 21:3 22:5 49:15 53:17 57:16 64:22 74:12 76:15 93:18,24 94:2,8 100:6,11 117:1 121:10 122:6 123:2 124:2,4,10 125:8 219:4 231:5
record 4:3 4:18 25:5 59:3,7 126:15 129:2 130:22 141:24 145:10,10 145:12,16 154:25 166:23 169:8 182:8 198:4,8 213:4 216:7 219:7 231:19 232:11 236:2 248:13,17 261:15 271:12 298:22,24 299:1,5 300:3,5,9 301:24 302:2,7 303:7
recorded 4:5 303:6
records 21:18,20 21:22
recreate 205:24 207:4

208:16
209:13
210:18
redirect
177:6
reduce 137:5
138:1
149:24
150:1
reduced
136:8,21
137:7,22
137:23
197:4
reduces 31:5
reducing
136:14,19
reduction
132:8,14
reestabl...
233:21
refer 8:15
9:2,7
49:19
78:14
139:20
140:8
reference
31:23
32:11,18
32:20,24
33:14,16
33:22
37:12,17
37:18
48:16,17
56:19 57:4
57:6 58:3
79:14,19
79:23 81:9
81:18,20
82:7,15
83:18,24
84:22 86:6
86:8,22,24
94:18
130:11
156:17,21
156:24
167:14
238:7,11
238:13,16
291:23
referenced
121:12,24
references
15:13
31:24,25
32:12,13
32:24 33:1
33:7 34:1
34:5,10,12
34:15,17
35:21
78:21
81:25 84:5
84:7,8,18
85:4,12
88:15,15
88:20 89:2
89:5,10,20
90:4
129:19,22
130:11
159:11,21
referred
99:25
127:5
152:9
260:11
266:24
296:15
referring
8:17 9:22
16:19
48:19
68:14 77:1
133:11
216:19,20
255:16
262:3
292:10
refers
131:24
172:15
214:21
reflect 94:8
94:12
205:25
206:14
207:5
208:17
reflecting
279:20
refresh
49:15
64:21 94:2
94:8,12,14
94:16
refreshes
219:3
refreshing
293:5
regarding
46:18
Registered
303:2
regular
126:17
127:9,10
127:19
regularly
62:21
reinvite
165:4
related 9:11
11:11
46:10 47:1
47:22
48:12,14
49:2,3
70:13
75:14
126:7
146:21
235:8
281:24
282:7,14
303:11
relates 8:1
82:19
131:14
relating
48:4,8
195:15
relation
47:22
released
64:23
Relevance
79:17
81:12
relevant
32:2 33:2
40:9 80:3
80:15
reliable
95:13
reliance
154:7
relied 79:13
283:6,14
283:22
relies 263:2
rely 168:5
282:24
relying
15:13
168:8
177:10,12
285:20
286:7
remain 270:4
remainder
181:15
204:19
277:1
remaining
220:24
221:7
222:9,20
223:3,17
remember
11:2,10
12:19
15:21
24:11 47:3
47:5 51:18
51:19,21
54:22 63:3
63:4,5,6,7
63:9,11
102:15
103:9,12
104:5
105:3
107:12
114:2,19
116:13,22
123:12,22
146:25
150:13
160:6
211:7
250:19
280:1
291:20
292:21
remind 58:23
207:24
250:24
299:14
remote 59:22
106:6
render
218:12
rendering
39:15
45:18 46:3
repeat
223:25
repeated
224:11,16
224:20
rephrase
221:4
replaced
245:11
replacement
182:14,22
183:23
210:16
replacem...
183:12
replicating
52:21
report 8:10
21:6,16,25
22:9,17
27:22 28:3
28:7,11,17
28:20 30:8
38:13
39:16
59:13
66:14
68:15 73:6
86:5,21
177:11
180:6

186:19
244:10
249:1
reporter
4:12,19
301:25
302:5
303:2
Reporting
2:25 4:13
reports 10:9
21:10
28:21
repository
248:3
represent
4:25 21:9
42:5 58:2
61:13
74:13
177:3,6
251:9
285:10
represen...
61:22
represented
30:18 34:4
51:5
represen...
6:4 86:4
86:20
request 8:21
23:2 27:20
38:14
59:18
62:15
63:22
66:11
78:19
85:10 91:2
93:10 98:9
98:14
99:12
126:5
143:10
147:4,12
147:15
151:8
153:2
156:3
159:7
160:17
166:7,10
167:18
188:13,17
196:21
201:20
211:13
214:20,23
215:1
221:16,20
225:2,4,11
225:17,22
225:23
226:3,10
226:12,21
227:1,2,2
227:3,22
230:10,11
231:15,19
231:25
232:4,7,8
232:17,25
233:8,13
233:22
234:14,14
234:21,21
236:13,23
236:23,24
238:20
249:4,8,12
249:17
250:7
251:7
253:8,16
255:18,22
256:9,10
257:3,16
258:1,2
262:23
269:10
270:2,21
270:25
271:1
282:3,17
requested
212:17
213:24
214:3,19
218:23
219:15
220:4,12
221:12
232:12,18
233:10
236:16
237:7
251:22
requesting
55:5,7
56:12
217:15
226:9
237:17
258:11,12
requests
218:20
233:4,12
234:2,23
237:10,19
244:24
246:22
249:20
255:12
256:21
257:5,11
257:19
269:5,13
269:22
271:4
require 41:3
41:15,22
42:18
45:17,23
46:11
71:10
162:19
163:14,18
164:20
234:4,7,11
246:21
247:16
249:3,12
required
39:15
81:25
105:10
165:6
204:1
237:15
requirement
45:9 98:16
163:23
168:23
209:19
233:15
234:10
237:9
252:12
requirem...
184:9,17
185:5,20
185:25
186:2,3
195:25
209:21
requires
46:8 163:8
163:10
165:1,4
225:3
226:21
230:10
235:15
236:22,23
requiring
152:23
research
24:7 47:23
48:4,21,23
49:5 50:20
62:17,18
62:21 69:2
72:5,10,21
73:2,9,14
73:16 79:7
101:19
102:4
103:8,22
104:11
105:6
116:9,25
148:25
149:5
150:4,8
283:25
researched
70:2
120:19
researcher
77:4
researchers
60:16
103:4
121:15
reservation
128:14,23
residence
73:17,25
74:1
resident
73:23
resolution
199:2
293:8,20
294:1,14
297:20
resource
128:23
respect
28:24
65:18,20
120:2
respective
195:5
responds
249:5
258:5
response
8:12,16
16:18 42:5
232:16
244:24
246:21
274:24
300:15,24
301:2,3,9
responses
271:4
responsi...
243:16
responsive
284:9
rest 195:25
195:25
196:13,14
restate
69:19
restraint
125:16

result 48:9
109:6
135:18
136:16,17
136:21
197:13
198:23
199:6,10
resulted
74:6
136:12
resulting
137:7
results
270:1
288:2
retained
3:19 5:24
11:13 13:5
13:12
61:10 62:3
62:8,11
77:18,19
77:25 78:5
146:10,16
retention
62:11
retrieve
220:19
222:5
244:23
246:22
247:17
retrieved
197:5,20
212:11
220:22
221:1,6
222:8,20
223:2,16
246:6,6
retrieves
219:9
258:4
return
270:25
reuse 234:23
237:10
reverse
257:8
review 6:10
16:21,24
17:4,5,17
17:18 18:5
18:11
19:15,17
20:20,22
21:18,20
22:8 27:4
27:13 28:2
30:2,4
31:10
36:22
45:14
48:10 57:8
58:8 88:4
211:21
231:9
259:7
280:14
302:16
reviewed
15:9,10,10
15:11,12
16:12 17:7
17:8,14,19
18:14,15
18:18,21
19:12,21
20:1,17,23
21:1,4
30:6 55:15
88:19 89:4
150:15
156:11
238:16
259:3,5
280:11
286:22
reviewing
35:20
36:17 86:1
216:10,18
286:21
rewrite
125:2
rid 108:19
rife 180:14
right 21:8
29:6 30:16
32:2 33:8
34:24 35:1
61:7,25
64:7,12
74:16 84:4
91:12 96:4
99:19
112:2
114:18
116:16
119:1
120:25
124:17
128:7
129:23
144:23
149:3,9,19
150:1
151:1
152:1
156:12
159:17,22
160:5
165:22
168:17,20
169:16
173:4
181:16
194:25
195:9
207:1
212:23
216:21
222:6,19
225:8
231:11
236:18
238:6,7
245:18,20
247:9
249:8
250:15
264:17
279:22
288:22
RMR 1:24
303:17
Road 2:12
Robert 18:24
Rolling
62:25
rough 302:11
302:15
roughly
295:14,17
RTP 283:15
283:16,16
284:1
288:7
290:9,15
290:19,22
RTP/RTSP
282:24
283:6,9,23
285:20
286:7,13
RTSP 283:15
283:17
284:2
288:7
290:9,15
290:19,22
rules 81:24
runs 289:2
rush 302:15

S

S 4:1 156:15
Sam 156:15
sample 252:5
Samsung
61:11,15
62:3,5,7,8
San 2:8
satisfac...
275:18
satisfy
195:24
208:22
226:12
saw 55:23
272:5,6
290:1
saying 37:20
38:10
41:23
55:12,16
96:19,20
96:24
133:11
134:4
135:4
140:19
144:10
160:24
162:18
166:20
173:12
175:7
178:11
181:24
183:6
184:1
193:15,16
194:5
206:21
207:22
217:10
219:16
221:2
222:21
225:14
229:25
232:22
233:7
234:22
236:5
262:9
263:16
264:2
266:5
275:21
295:21
says 29:19
29:24,25
61:8,21
67:7 80:21
91:20 96:6
106:16
114:3,21
130:22
132:3
156:1
169:22,24
170:3,13
170:21
178:16
182:9,24
183:1
184:5,23

189:6
191:15,17
191:19
192:1,19
193:3
194:2
195:3,10
195:12
196:14,23
197:2
207:1
216:21
228:14
229:16
233:9
234:19
246:5
262:3
269:3
274:24
282:23
285:12
286:22
288:7,17
289:2
295:6,20
scalability
272:18
scalable
114:6,9
scale 134:25
scaling
99:21,23
99:25
100:4,7,16
100:18,21
105:3,5,5
110:14
111:13,19
111:23
112:16
128:24
130:8,25
134:17,23
134:25
135:3
143:25
scenario
181:5
scenarios
241:17,21
scene 137:13
210:20
schematic
216:8
251:24
scheme 54:25
131:1
schemes
111:13,19
128:14
129:3,10
130:18,23
134:17,22
141:20,23
141:24
142:2,16
142:21,24
schools
59:21
science 74:3
104:9
scope 36:24
58:5 77:10
77:22
79:17
81:12
82:18 83:8
146:6
169:9
193:23
194:5,12
195:17,20
255:14
256:13,24
257:13
265:7
screen
102:18
276:13
277:3
278:10
279:8
screening
102:15
274:15
script
249:23
250:1,2
scripts
249:2,20
249:21
se 263:14
search 35:12
35:14,16
35:19
36:18
searches
35:8 49:1
second 44:8
58:11
90:14
105:4
107:18
114:10
119:7,9
126:2,14
126:14
128:3
135:16,19
135:23
136:15,16
136:20,20
137:6,6
138:1,2,10
138:10,12
138:12
139:1,3,8
139:10,14
139:15,18
139:22
140:9,24
140:25
143:15
153:5
162:23
172:23
175:23
179:1,16
189:6,7,12
189:14,18
189:25
190:4,11
190:18,25
191:1,7
192:1,2,11
192:18,21
192:22
193:4,5,9
193:20,24
194:2,7,13
194:20,24
195:4,22
196:9
197:6,20
200:6,8,14
203:19,19
204:2,8
205:8,9,10
206:1
207:6,16
209:3
210:21
211:5
243:23
246:19
262:25
284:6
288:6,17
288:22
289:3
295:3,7,12
295:13,17
296:14,20
296:21
297:2,7,7
297:18,21
298:8,8
second-t...
157:19
seconds
200:16,20
secret 263:1
263:6,12
263:18,24
264:2,3,14
264:18,24
264:25
265:2,2
266:6,7,13
266:24
267:25
section 23:4
23:9,11,14
23:19
27:23 28:7
28:11,17
29:3,5,8
29:12 84:5
84:8,18
85:4,13
88:15
90:22
111:6,11
126:3
132:3
134:12
143:11,15
159:10
281:17
282:6
297:22
sections
182:9
security
157:22
158:17
see 9:4 23:6
27:25
33:12
38:25
39:11,17
43:9,10
44:14
45:20 48:1
49:11
50:25 51:8
52:3 55:10
61:21
73:11
78:24 79:3
80:6 81:2
83:23 84:1
87:17,17
90:22 92:9
101:21
102:9
103:6
104:14,15
105:16
111:8,14
111:15
113:21
121:5
126:8,11
126:20
127:23
129:7
130:11,19
131:4

132:5 134:20 136:14 137:7 142:5 143:13,21 144:2 147:6,9,10 150:6 151:13 153:16 154:3,8 155:14 156:16 159:9,12 164:16 166:22 167:1 168:3 171:9,10 172:6 174:4 176:25 177:2 178:4 180:22,23 182:6,17 184:13 185:9,10 186:21 187:3 188:24 189:10,21 195:23 196:16,22 196:25 197:10,11 204:18 209:19 212:14 213:10 216:12 219:11 220:6 222:21 227:18 231:22 232:14 239:1 244:18,19 244:25 245:6 246:24,25 259:10,15 260:2,7,17 260:19 261:20,21 262:14,15 269:3,6 271:9,17 274:18,19 275:4 276:20 277:19,24 278:2 279:15,22 279:23 280:21 281:19 283:1 284:12 285:2,16 287:7,9,23 288:7,9 289:4 290:17 294:21 295:4,10 296:3,7,14 296:19 297:8,24 298:3,9

seeing 88:1 136:21 141:6 180:2,17 180:18,19 216:17

seen 12:13 26:25 52:23 55:8 55:14,17 56:3,5,13 56:14,15 56:17 57:1 79:22 216:3 265:9 286:13

sees 136:17 138:3 181:2

segment 177:20,24 178:1,7,8 179:3,3 182:15,20 182:21,23 183:17,22 183:23 185:12 186:4 214:3

segmented 262:7 267:11

segmenting 52:11,19 53:21 54:9 57:11,17 101:5

segments 51:5 52:12 101:2 171:7,13 171:21 172:5,9,14 172:15,20 172:22 178:12 182:5,12 183:2,12 183:14,20 184:7,10 185:2 188:3,6 189:2,13 212:5,11 212:18 213:7,8,24 214:18,22 214:24 215:2,4,8 215:14,15 227:25 228:4,7,25 229:3,13 229:15,17 229:23 230:1,6 241:25 250:6 267:9

select 200:23 201:4 214:8,14 214:18

selected 96:8 215:1 231:21

selecting 150:24 201:11

selection 240:19

sender 106:7 106:10 107:3 142:11,14 142:22,23 144:17

sender-b... 106:12

sending 249:5,17 250:7

sends 212:1 219:9 249:4,12 249:13,21 250:1 257:20

senior 73:15 73:20

sense 6:13 118:2 125:1 139:6 203:15 233:15,19 254:7 281:4,5

sent 133:25 134:1 135:18 142:22 252:9 253:25 256:9,10

sentence 41:2 42:16 44:9 48:18 49:4 50:19 51:2 55:3 55:12 67:11 80:23 96:6 111:10 126:15,22 129:1 131:6 132:2 143:15 151:11 153:4,11 153:22 154:24 155:10,11 155:16 157:19 164:7 166:20 168:19 171:9,10 172:3 173:7 186:23 227:11,16 246:19 259:23 260:4,13 260:18 261:14,15 262:25 271:11 274:9 282:23 284:6 285:12 294:23 297:23

sentences 94:13 130:21 169:6 182:3 284:21

separate 112:21

115:21
133:22
162:25
166:16,17
166:18
174:7
283:12
separated
143:19
144:15,22
separately
60:8
112:14,19
112:24
113:14
134:1
160:22
161:4,15
162:2,15
168:7
September
303:21
sequence
89:11
133:25
134:1
151:12,15
151:18,21
serve 10:21
11:9,14
12:10,17
served 48:7
284:8
server 51:3
51:12
93:15,21
93:23 94:9
94:10,20
94:21 95:3
96:8,15
97:3,15,25
98:18
142:9
155:23
212:10
214:9,15
214:19,24
215:2,5
221:17,21
222:1
225:4
231:20
232:13
233:1,16
236:18
249:5,5,9
249:10,13
249:13,16
249:18,21
250:3,4
252:3,9
253:11,15
254:1
255:12,19
255:23
256:9,10
256:21
257:6,10
257:16,19
257:20
258:1,1,3
258:4,5,11
258:12,13
263:4,10
263:24
264:9,16
265:5
270:21,23
285:13
286:13
servers
51:14 53:6
53:11,12
53:25
54:13
98:25
233:17
234:8
244:3,21
246:21
247:17,23
248:4
267:13,14
267:22
272:2,3,11
273:18,19
273:23
282:24
283:6,14
283:20,22
285:20
286:7
service
47:21
263:15
services
271:16,22
set 28:12
51:4 54:24
58:12
59:21
99:11
100:11
108:15
160:9
188:2
214:22,22
303:5
sets 51:4,13
295:2
setup 276:16
seven 83:22
share 9:13
281:6
shared
247:23
shares 231:2
sharing
102:15,19
sharp 136:12
SHEET 304:1
Sheng 2:7
3:4 4:21
4:22 5:12
7:7 13:11
13:17
14:19
25:14 26:8
26:17 29:2
33:24
34:23 35:6
37:5 39:6
40:22
41:13
45:10 46:5
46:16 53:2
54:18 56:1
58:7,19,22
59:8 60:22
61:1,23
69:5,9,16
72:19
75:12
77:11 78:1
80:1 81:16
82:4,24
83:3,10
87:7 88:8
89:18 90:2
90:18,21
95:9 96:2
97:13
109:15
111:4
115:20
120:20
122:1
123:6
130:13
137:20
138:8,17
141:10,14
145:17,21
146:9
148:13
160:2
165:11
174:18
175:15
180:24
185:3
193:1
194:22
197:24
198:9
201:3,13
201:17
203:4
204:6
206:11,24
207:18
209:23
210:17
211:1
218:15
222:18
223:10
224:17
226:1,14
227:5
228:11,15
228:18
229:1,7,20
241:19
242:7
243:5
248:7,18
253:1
254:10
255:6,17
256:18
257:7,18
258:9,17
265:19
267:1
268:24
270:10
273:1,6,10
273:12
275:14
276:7
278:6
279:1,18
281:16
286:4,17
289:18
290:6
291:9
298:21
299:6,10
299:14,21
301:12,20
302:3,10
shim 105:24
106:4,14
106:15,24
107:3
shock 274:10
shockingly
274:15
276:5
277:23
278:20
short 58:23
shorter
209:6,8,10
show 83:14
141:6
202:10,11
274:11

275:5,7,15
276:22
277:1,10
277:19
278:3,8,17
278:22
285:15,21
286:8,14
289:3,13
289:21
290:5,23
291:17
292:3,20
293:2
show's 275:8
276:13
277:3
278:10
279:7
showed
143:16
144:12,18
144:19
289:21
showing
138:20
250:18
287:1,25
289:10,10
289:13
290:25
291:4,13
291:13
shown 275:16
275:25
293:1
300:20
shows 217:2
250:22
292:2,19
shuttle
63:17,18
side 54:11
271:7
sign 302:17
signature
61:25
78:11
signed 22:12
92:17
significant
48:12
143:18
144:22
145:4
signific...
294:13
signing
22:10,16
silly 134:5
similar
32:17
101:1
180:7
209:14
256:8
similarity
151:3
simple 51:23
56:12
128:21
132:10,19
133:1,4
200:9
simplified
158:25
simply 96:23
100:22
143:5
281:22
282:12
simulate
287:6
SimulCode
294:20
simultan...
239:7,11
single
107:25
163:3
164:13,20
165:4
217:13,16
224:7
225:4,4,16
225:23
226:2,10
226:12
227:2,3,3
227:4
230:11,11
230:11
232:8,16
233:13
234:14,21
236:23,24
237:20
239:17
262:20
267:16
singular
76:6
sit 22:21
46:6
site 167:22
167:25
168:2
sitting
18:17
23:18
24:22
33:25 40:7
40:11,19
46:9 55:2
57:13,15
57:20
61:20 69:3
70:3,5,11
76:20
79:19 81:5
82:13 90:8
93:18
94:19
114:20
117:1
119:25
121:11
122:13,21
123:21
129:23
163:16
176:9
195:23
204:17
206:12,18
250:20
283:21
290:24
situation
181:18
Six-zero
154:22
Sixty 154:21
Sixty-one
157:9
size 197:4,7
197:13,21
198:22
199:18,21
199:24,25
200:4,23
201:5
294:14
sized 52:20
53:22
54:10
sizes 261:18
261:25
skeptical
153:25
154:6
skill 38:19
41:7,17
42:22 43:2
43:25
44:25 45:7
46:20
65:12,16
117:3,11
118:10
119:12
120:1,8
170:4
174:9,17
183:5
196:5,15
208:13,23
209:12,24
232:21
233:2,3,11
237:2
252:22
253:22
254:2,13
254:22
255:3,7,10
255:24
256:3,6,19
257:1,9,24
258:7
264:20
skillful
279:6
skim 281:21
282:11
slide 138:21
141:6
173:14,14
173:19
174:16
181:3
202:13,14
203:3
285:15,21
286:8,14
289:3,13
289:21
290:5,23
291:16
292:3,20
293:2
slides
172:23
173:2,7,10
173:12,17
173:25
174:2,10
175:24
176:6
177:1,5
179:2,4,17
179:21
180:2,11
180:20,23
181:14,15
181:21
187:15,21
Sling 20:13
slower 179:8
small 53:16
53:22
54:10
57:12,17
170:5
233:25
237:17
262:8
smaller
100:24
101:1,2

Smart 243:9
smarts
243:12
smiling
144:2
smoking
89:20
so-called
293:6
software
67:19
93:14 94:5
123:16
124:14
125:1,5,18
125:22
144:10,11
212:2,17
213:23
214:8,14
214:17
solely
169:11,20
170:2,8
solution
51:23
106:23
273:22
Solutions
262:13
soon 96:11
97:19 98:3
302:11
sophisti...
131:1
sorry 13:9
14:16
27:11
36:11
64:17
65:21
69:22
90:16 94:6
98:8
111:15
136:6
141:21
152:15
153:5,6
154:20
155:2,3
179:6
185:24
194:20
199:19
205:10
213:19
221:1,2,22
228:16
236:6
245:18
275:11
286:2
288:10
290:18
299:11,25
sort 48:24
115:24
217:9
250:4
280:24
288:1
sound 74:16
sounds 64:12
95:7 100:5
134:4
source 244:1
244:4
290:14,20
sources 93:4
290:12
space 63:17
63:18 65:5
speak 58:24
59:9 140:4
198:10,12
299:7,15
299:21
speaking
48:18
299:24
specialized
162:19
271:15,22
272:1,10
273:18,23
specific
10:24 41:3
41:15,22
42:18
48:14,17
76:5 100:5
115:5
136:24
163:21,23
165:1
214:22
specific...
13:3 35:14
49:8
121:24
122:19
123:12
214:20
220:8
282:10
specific...
9:23 17:25
18:2 43:6
44:10
46:23 50:3
176:16
231:3
247:2
251:11
252:20
specific...
9:14
specifics
6:7 44:6
80:22
284:25
speculate
89:15
273:25
speculation
34:20
spell 103:14
spend 17:10
21:15
spent 21:24
22:3
splice
210:24
split 6:2
7:16
splitting
261:16,23
spoken 19:4
19:6 20:8
202:16
spread
242:12,13
spring 57:10
SS 303:1
stack 75:18
105:19
106:17,20
stages 271:3
standard
29:15 30:9
31:4 38:1
38:5 91:8
91:18
92:13
93:22
94:10,21
96:14 97:3
98:18,25
100:20
294:25
300:13,18
300:23
301:1,11
302:8
standards
29:11,22
29:25
145:1
standing
77:21 83:8
146:4
standpoint
54:25
start 91:5
111:5
118:8
148:18
156:9
171:11
177:15
181:13
182:4
234:6
started
67:14
70:12
105:9
106:2
108:10
124:19
276:23
starting
66:18,23
67:12 68:2
72:4
162:16
177:19
186:20
211:20
238:21
starts
186:24
188:20
238:24
startup 98:4
state 30:12
38:16 41:2
42:17 43:1
43:6 44:10
45:15
47:17,20
47:24 48:4
49:5 50:19
51:2 55:4
59:20
65:18,23
66:2 68:15
73:8 79:8
80:2,24
85:15 92:2
92:6
101:17
103:3
104:10
112:2,6
113:18
116:16
121:1
153:12,22
164:3,6
167:20
171:5
177:23
244:20
246:20
302:1
stated 23:10
40:18
49:13

92:22
93:19,25
121:15
204:11,12
301:1
statement
28:25 40:2
40:3 55:22
65:3 80:5
80:8,19
81:4,19
82:1,16
84:12,13
84:21,21
85:5,8,14
85:16,18
86:11,11
86:14 87:4
87:5,16
92:16
104:17
125:14
140:12
142:19
158:11
162:1,2
165:8
182:25
183:5
228:21
229:12
245:16
269:17
270:13
statements
44:7 80:13
92:3,4,6
94:23
states 1:1
44:10
112:11
143:16
155:11,11
234:13
239:14
259:23
260:5,14
284:7
294:24
static 68:9
180:19,23
stating
39:13
81:14
85:14
150:3
station
253:12,17
status
284:23
stay 151:5
271:6
Staying
50:18
steam 92:11
stenogra...
4:5 303:6
Stenotype
1:23
step 123:5
174:19
175:16
211:20,25
212:13,16
212:22,24
213:17,23
214:2,4,5
214:7,13
214:23
215:3,10
215:13
217:20
218:3,6,19
218:22
219:1,13
219:17,19
220:9,10
220:16,18
220:23,25
221:6,9,11
221:13,14
221:16,20
221:24
222:4,9,11
223:2,5,17
steps 122:14
213:5,6
215:13
220:24
221:2,7
222:10,21
222:23
223:3,18
224:16,18
224:19
232:3
stills
202:13,22
291:14
stock 210:10
Stones 62:25
stopped
278:22
storage
244:23
245:3,5
246:5,7,8
246:9,11
246:14,23
247:6,7,13
247:14,18
247:19,22
247:22,24
store 215:4
221:25
stored 93:3
218:24
219:7,15
220:7
252:3
storing
56:11
straight
217:21
straight...
142:3
143:3,4
162:8
253:21
254:12
stream 63:17
71:21 75:8
75:9,11,22
75:23,24
92:25 93:3
98:4,24
99:5 100:1
100:8,23
100:25
101:2,6,7
107:18,24
108:16,17
108:18
112:24
122:17
124:11
129:6
131:8,24
132:1,9,10
132:13,18
132:19,25
133:1,15
133:16,18
142:1
150:23,24
155:23
163:4,9,18
164:14,21
165:5
231:21
239:17,21
240:3,13
241:5,12
243:17
274:11
289:9
294:1
296:15,19
296:23
298:4,7
streamed
62:22 63:1
63:8,13
112:23
113:13
203:12,14
217:3
287:11
streaming
47:23,24
48:5,9,13
49:2 50:20
50:24 51:7
51:23 52:8
55:6 60:4
60:7,19,21
64:3,6,10
64:23 65:8
65:9,13,17
65:22 66:1
74:7,25
76:11,16
76:18
78:22 91:4
91:6,16
92:11,18
93:12,22
94:3,10,21
95:2,19,23
96:15,16
97:4,14
98:17,24
99:5,21,24
100:2,13
101:18,24
102:1,4,25
110:4,19
112:13,14
120:5
135:15
146:21,24
153:13,24
154:1,10
154:15
155:1,12
155:19
157:15,21
158:15,24
160:21,25
161:9,11
161:13
162:10,13
162:21
164:10
216:16,23
217:11
239:6,10
239:13,16
253:25
255:8,11
255:22
256:16,20
257:10,15
258:24
259:24
260:6,9,11
260:16,22
261:2
262:12
263:2,15

264:9,10
264:11,12
265:10,12
265:17
266:15,16
267:4,6,6
267:25
268:9
271:7,14
271:21
272:2,11
276:11
280:3,4
281:8
283:10
284:22
285:5,18
286:5
288:4
295:16
streamlet
40:9 45:12
166:14,15
217:16
218:20,23
219:7,8,8
219:9,10
219:15
220:4,7,7
220:12,19
220:22,24
221:6,8,12
221:17,17
221:21,21
221:25
222:3,5,8
222:10,14
222:15,19
223:2,4,16
223:18
224:11,20
225:2,5,11
226:22
227:4,4
230:10,11
230:12
231:19,25
232:4,7,17
232:25
234:14,15
234:20,20
236:13,16
236:22,23
236:24
237:10
270:20,20
streamlets
38:24
39:10,14
39:20
40:14 51:5
216:10,15
216:16,19
216:22,23
217:2,8,11
221:25
224:1
225:17,22
225:23
226:3,8
227:1
232:12,18
233:8,10
233:18,25
234:8
237:8
244:23
265:15
267:13,21
270:2
streams
66:16,20
72:7 97:9
112:9,12
112:23
113:2,6
126:17
127:4,14
127:16
129:13,16
129:25
130:25
131:3,22
142:18,23
240:24
267:21
284:7
295:7
Street 1:22
2:3,7 4:15
strike 14:11
18:22
28:15 30:3
35:18
36:16 39:7
40:9 46:8
63:8 65:25
72:25 91:5
94:6
108:25
113:12
136:17
161:11
175:17
183:18
186:7,8
191:5
192:8
195:18
208:15
216:25
218:6
221:22
255:9
268:16
279:3
283:4,20
290:7,13
291:10
292:15
293:14
301:7
structure
54:23
252:5
stuck 181:14
284:8
student 24:8
24:11
51:18
103:20,24
104:2,3,8
104:22
105:1
students'
24:6
studied
52:17
stuff 284:17
subcolle...
188:22
189:2,7,13
190:17,18
190:24
191:2,5,7
191:7,10
191:11,14
191:16,23
192:2,10
192:11,13
192:19,21
193:3,5
203:19
subcolle...
171:8,14
171:21
177:25
178:1
182:10,13
182:15
183:14,20
184:7,10
subjective
116:18,23
117:15,20
118:1,2
submit 11:22
80:11
submitted
8:11 12:1
15:10
16:16,22
18:6 19:19
20:24 21:6
21:10 42:4
42:6 61:5
61:14 66:6
77:15
90:12
146:2
152:22
subsequent
224:11,20
233:4
234:23
substance
299:22
substantial
162:20
294:13
substant...
177:20,24
179:2
180:7
184:8
185:11,11
189:19
193:11
195:5,13
204:21
209:5,9,13
substant...
21:11
33:15
80:25 81:9
81:20 82:7
82:15
84:10,16
84:22 85:2
85:6,11,19
88:19 89:4
substitute
183:11
substituted
184:11
success
143:18
144:23
145:1,4,5
145:7
successful
111:3
268:16,18
272:22
273:19
successf...
110:2
successive
224:1
suddenly
139:1
sufficient
57:20
169:13
170:9,18
252:21
277:21
suggest
162:9
suggestion

174:4
210:12
suitability
111:12,18
Suite 2:7,13
suited 112:3
157:20
158:14
summarize
236:11
Summary
143:12
summer 57:10
super 63:5
158:10
supply 239:5
239:9
support 8:11
16:17,22
18:6 21:6
21:10 42:4
64:15 66:6
111:23
153:7
160:11
161:2
162:1
170:24
176:16
177:10,14
202:1
224:24
247:2
301:2
supported
29:20
30:15
59:25 73:9
239:13
supports
168:9
186:18
supposed
205:6
sure 14:20
15:18 28:5
31:12,16
36:13 37:8
38:8 46:22
59:1 62:14
69:21
73:15
78:16 80:2
93:20
100:17
103:11
110:24
112:15
118:19
126:4
128:11
134:14
138:18
140:15
141:13
143:9
148:17
154:13
156:7
179:9
198:2
200:2,11
211:6,22
231:14
235:17
242:22
245:15
246:16
247:9
264:21
269:9
271:10
275:11,15
275:20
281:12
292:23
sustain
276:2,18
sustainable
149:23
275:24
sustained
288:5
switch
179:21
181:3,8,13
184:16
185:1
switched
180:2
276:24,25
278:8
279:3,5
switching
181:23
sworn 1:19
5:9 304:23
synchronize
134:2
169:14
170:10
synchron...
170:15,19
system 66:19
72:6 75:6
76:11,16
91:5,6,16
92:18
93:13,22
94:4,10,21
95:2,19
96:15
97:15,23
98:17,24
99:5
102:13,21
102:24
103:5,23
104:13,21
105:7
106:3,20
106:25
108:6
109:5
110:3,18
111:7,11
111:22
112:2,7
113:5,8,11
113:13,19
113:23
114:15
115:5,6,22
121:16
122:12
124:15,18
124:20
125:3,11
134:12
135:15
142:10,10
143:17,24
144:11,13
144:16,20
145:6
146:24
149:10,16
149:21,23
154:1
179:11
180:1,8,9
180:25
183:16
184:16
188:21
191:22
200:22
201:4
212:21,24
213:13
214:5
215:3,9
220:11,15
220:18,23
221:7,13
221:24
222:4,9,20
223:3,17
223:25
236:15,21
239:4
253:25
255:8,11
255:22
256:16,20
257:10,15
264:9
267:4,6
268:12
277:10,11
280:9
285:7
289:12,20
290:22,23
systems
48:11,24
56:17
72:22 97:4
119:5
149:6
150:9
154:11,15
180:6
239:15
243:25
267:7
283:25
285:6,10

T

T 296:16,19
296:23
table 3:1
287:22,25
288:25
289:1
296:18,24
297:5
298:6
tables
296:12
tail 242:20
take 6:9
58:22
107:23
122:14
123:4,8,22
123:25
174:14,19
175:16
185:11
197:24
200:16,19
205:7
207:19
219:2
240:20
248:9
265:15
289:8
take-away
53:10
take-home
205:5
take-on
161:1
taken 1:21
1:23 18:12
20:15 59:4
145:13

294:10
299:2
300:6
takes 186:4
talk 128:13
164:1,25
217:17
248:20
250:20
299:19
talked 39:4
203:16
talking 57:2
83:12
122:7
135:20
140:20
165:9
195:14
198:13
200:10
233:11,12
235:13
262:5
277:17
278:15
283:24
293:9,22
talks 204:19
task 35:20
TCP 154:7
237:15
263:3,23
264:7,15
265:3,16
266:14,18
266:21
267:3
268:4,8,13
268:14,19
269:13,23
282:14
283:18
284:5,20
TCP-based
282:23
283:5,14
283:19,22
285:19
286:6
TCP/IP 95:11
95:13,19
95:24,24
96:9 97:16
98:1
105:18
167:23
169:11,21
170:2,9
teach 162:9
233:19
teaches
162:11
170:19
teaching
74:4
162:17
163:13
210:11
team 103:8
103:17,22
104:19
105:6
108:5
121:1
Teams 16:8,8
102:13
tearing
233:21
technical
73:3 292:6
technique
52:18
109:6
132:20
263:10
264:1,4
269:12,22
techniques
100:11
104:25
105:2
112:17
132:11
133:1,4
260:1
technolo...
1:6 4:9
91:9,19
92:14
technolo...
200:11
technology
52:8 66:19
72:6
104:11,19
108:7
110:4,19
119:18
137:4
258:25
259:24
260:5,10
260:22
261:2
263:2
265:3
268:1,9
271:21
272:2,12
274:12
278:4
281:8
285:19
286:6
teens 55:24
telecomm...
105:11
telephone
168:1
telephony
168:1
169:3
tell 70:6
81:5
121:17
122:14,22
122:25
123:3
128:3
129:24
162:6
179:25
230:17
250:21
290:24
telling 96:6
tells 233:3
233:10
250:6
temporal
134:17,23
135:3
152:4,8
Ten 211:9
term 10:2,5
24:24
38:23
39:10
40:24 41:2
41:14,16
41:18
42:14,17
42:23
45:12
46:17,19
66:15
99:13,20
100:21
102:16
107:8
273:8
termed 50:22
terms 41:19
45:16,22
46:7,10
56:10,13
84:7
100:19,20
110:1
138:15
163:13
254:18
260:15
267:3
270:16
271:1
272:15,21
280:2
Terrible
217:1
test 289:2
290:23
testified
5:10 7:9
14:20
17:13 54:9
68:1 69:12
69:13
117:19
121:10
130:6
156:20
186:17
203:17
204:9
208:4
255:21
291:12
testimony
7:12,13,14
39:2 40:16
41:10
69:13
156:23
194:1,10
194:11
203:22,24
208:1,17
209:1,14
228:14,15
289:19
290:21
testing
108:22
tests 287:12
287:20
288:12
289:20
290:4
291:7
text 202:14
202:15,19
208:9
253:23
254:16
thank 8:9
42:2 47:19
64:20,24
83:20
101:14
155:9
227:14
235:6
251:3
262:22
282:2
thereof
177:25
178:1

182:10,13
183:14,20
184:7,10
thing 108:10
108:23
116:20
125:17
247:8
268:2,11
272:22
things 35:25
55:2 56:8
56:9 67:4
72:11
102:12
116:23
140:6
147:21
148:11
161:3
200:7,9,15
200:18
242:20
243:14
271:2
284:25
think 5:17
6:12,14,16
10:11
14:10
16:11 17:7
23:16,17
24:4 33:21
35:4 37:1
37:20 44:5
47:10 57:1
57:10
67:18 70:8
70:10,25
71:7 74:3
80:14 85:9
86:10 97:9
97:11
100:19
102:14
105:2,4
107:11
109:12,23
110:6,25
114:9
115:13
118:7,12
119:6
120:8
123:17
128:15
129:18
131:23
132:16
139:5
140:19
141:8
144:5
146:7,22
148:4,5,14
150:11
154:13
158:10
159:18
160:24
162:8
163:11,15
163:22
165:7,22
169:17
173:18,19
174:6
178:11,22
183:5,25
185:10,23
190:2
193:22
196:5
197:22
205:3,6
206:8,9
207:15
208:22
213:14
221:10
222:25
226:18
229:11,14
232:21
233:2
235:14
236:12
237:4
238:4
241:16
245:10,16
246:3
247:20,21
248:1,5
251:1
253:20,22
261:8,8,9
263:13,16
264:2,21
266:13
274:21
276:9
277:16
278:1,14
278:18,21
280:17,18
284:1
286:12
288:19,23
291:3,21
291:23
292:1,18
293:4,5
295:19,21
299:18
300:25
301:14
third 114:25
115:10
129:1
third-to...
83:18
132:2
231:12,18
third-to...
83:24
Thirty-t...
227:14
thought
12:22
29:21
51:22 52:1
52:5 75:16
79:22
144:3
161:6
235:19
242:25
259:21
263:12
265:2
266:4
three 18:8
113:19
114:16,22
115:6
246:14
275:3
three-ish
18:9
threw 135:1
136:11
throttle
285:14
throughput
132:14
throw 107:23
133:15
throwing
108:1
131:20
143:5
thumbnail
296:5,10
296:15
297:14
time 4:3
11:8 13:24
16:3,6
21:15
22:20 24:1
31:2 38:19
46:21,24
49:10 50:6
50:14
51:11,19
52:9 55:16
59:2 66:13
66:16,20
67:4,10
68:17
71:13 72:3
72:7 74:4
74:18 75:4
88:9 93:20
98:4 105:2
107:21
115:24
116:5
118:16,19
119:8,13
126:25
128:19
130:8
133:20
134:5
142:25
145:8,15
147:18
148:7,9,10
148:20
149:1,6,17
150:9
151:23
152:5
153:18,25
155:1,12
155:19
157:15
158:3
172:10,16
172:20
174:21
175:8,10
176:11,11
185:12
186:4
187:14,20
198:3,7
215:9
227:16
228:22,23
229:12,16
229:17
230:1,2
234:1
243:15
248:12,16
254:3,22
259:3
271:1,5
276:11
277:7,17
278:5,14
279:13
280:1,11
293:15
295:15
298:23
299:4

300:8
301:23
303:4
timeframe
150:16
timeline
40:24 41:3
41:8,21
42:14,18
42:23 43:3
44:11,17
45:13
249:3,4,6
249:13
250:8,24
251:12,17
251:21,24
251:25
252:2,6,8
253:11,16
257:5
258:3,5,6
times 5:16
16:24
17:20 18:5
18:9 22:8
130:24
204:17
237:20
238:10,17
259:7
280:14,17
timesheets
21:22
title 35:24
36:15
titled 23:4
27:23 29:5
74:14
78:22
90:22
110:13
111:6
126:3
134:12
143:12
159:10
259:1
262:12
280:8
281:17
282:6
294:19
titles 36:5
today 4:23
5:19 9:6
13:24 14:4
15:5 18:17
22:21
23:18
24:23
25:21
33:25 40:7
40:11,19
46:6,9
49:24 52:8
55:2,6,16
56:2 57:14
57:15,21
61:20 69:4
70:4,5,11
76:20
79:19 81:6
82:13
87:14 90:8
93:18,25
94:19 99:9
102:14
105:14
107:8,13
107:17
109:4
114:20
116:6
117:2
119:25
120:6,9,16
121:11,17
122:13,21
123:21
124:10
130:5
134:6
136:4,25
137:4,18
137:21
153:13
154:16
163:17
176:9
177:7
194:1,11
194:11
195:23
204:17
206:12
208:1
283:21
289:19
290:21,24
300:13
today's
145:1
301:18,22
told 263:17
tolerable
137:24
tolerance
270:14
Tom 296:16
tongue 235:3
tool 102:17
top 61:3
69:1 70:7
83:22
112:1
113:16
120:25
206:8
296:23
topic 120:23
148:25
163:15
219:25
topics 49:3
TOR 64:16,17
total 17:10
18:8
296:19
297:1,6,18
298:7
totally
289:21
Trade 11:5,7
TRADEMARK
1:1
traditional
95:8
133:25
265:11,17
traffic
157:24
158:19,23
trailer
287:19
trailers
287:8
training
205:3,16
205:22
transcribed
1:24
transcript
18:11,19
18:21
19:13,16
20:18,21
302:1
303:6
transcri...
148:15
transfer
66:20 72:7
95:11
155:25
228:23,23
229:13,16
229:18,22
230:1,2,5
243:1
262:5
transfers
97:15,25
transforms
96:8
transiting
270:20,22
transitions
136:12
transmis...
66:25
67:22 68:6
68:21
69:15,22
69:24
70:14,17
70:23 71:3
71:7,11,16
71:25
72:13
75:10,24
104:12,20
104:25
108:7
131:17,19
133:17
149:7
150:10
170:11
184:8,17
185:5
186:3
189:20
193:11
195:6,14
195:15
196:15,18
196:23
197:3,5
198:19
199:16,20
199:23
200:22
201:6
204:21
209:5
281:18
282:6
transmis...
169:14
170:20
transmit
107:1,25
131:11,25
133:16
134:8
135:7
148:7
158:23
185:12
transmitted
66:17
107:3
113:9
135:13,14
149:22
271:4
transmit...
106:8
108:2

113:4
119:21
131:16
135:2,16
147:18
148:19
149:1
transpired
82:22
transport
153:13
261:18,25
262:12
treat 112:18
treated
160:21
161:14
162:2,14
treating
168:6
TRIAL 1:1
true 29:1,8
40:2,3
67:24 92:4
92:5,23
127:1
142:24
161:25
183:7
187:12
240:15
255:12
257:8
270:13
299:19
303:7
truly 278:18
truth 31:6
truthful
156:24
try 6:10
105:25
106:6
108:18
136:8
trying 36:20
37:17 53:3
53:15
82:10
96:19
108:22
115:25
117:6
118:5,18
119:16
120:7
140:2,3
160:5
162:5
185:8
208:24
248:5
250:24
287:2
Tuesday 1:16
4:4
turn 8:19
22:25
27:18
38:12 47:8
59:12
61:24
62:12 73:5
78:17
90:11
91:24 93:6
98:7 126:1
127:21
143:8
147:1,11
151:6
153:1
156:2
159:6
164:4
166:5,19
167:16
171:2
188:11
201:18
211:12
215:22,25
231:6
238:19
248:19,23
250:14
251:1
253:2
262:11
286:18
294:16
turns 40:20
TV 4:8 243:9
TVs 243:12
Twelve
101:16
twice 200:19
twisted
235:3
two 15:25
16:11 43:7
43:12
79:22
105:2
113:25
114:17
115:7
119:7
123:1
127:22
128:18
130:21
142:10
169:6
172:4
173:22
176:14
200:16,19
207:8
208:15,25
209:13,15
210:19
225:17,22
225:23
235:20
246:11
270:18
282:9
283:11
302:5
two-dime...
110:14
111:23
130:25
two-way 60:1
112:8,12
112:22
113:1,6
type 105:10
134:25
296:15,19
296:23
298:4,7
types 104:23
157:23
158:19
167:6
typical
114:11,13
typically
35:14,15
82:11
99:25
102:14
119:1
151:25
152:7
282:24

U

U.S 49:8
61:5 74:10
77:15
156:17
UDP 283:17
283:18
284:3
ultimately
226:25
unambiguous
233:1
UNC 73:17,23
73:25
104:12,20
108:7
110:20
148:25
149:5
242:6
284:3
uncompre...
166:24
underlying
95:10
underneath
171:5
understand
7:25 8:16
10:15 19:9
20:14
24:18 41:7
41:17
42:22 43:2
44:1 45:1
45:7 56:8
65:21
80:12
82:10
89:25
96:20
100:21
108:18
120:9
124:13
138:7
142:19
144:25
148:3
152:8
162:5
163:11
164:18
170:4
174:9
183:6
184:15,23
196:16
199:4
210:7
217:23
237:4
254:6
255:15
256:14,16
260:9,20
261:1
262:4
275:21
285:9
290:11
292:23
296:11
understa...
8:6 10:18
20:6,10
25:2,15
26:10,21
30:8,13,22
31:2,3,8
31:13,21

32:3,5,6,7
32:10,16
32:22
38:17 40:8
40:12
80:16
130:5
181:12,22
191:4,6
213:12
219:18
252:11,14
259:2
261:4
262:9
285:5
286:25
289:6
290:7
291:24
292:13,17
296:9
understands
196:6
understood
38:11
107:8,13
110:1
142:15
163:3
164:13
173:20,21
287:13
undoubtedly
92:22
137:24
198:20
undue 252:24
255:4
256:4
257:4
Unified 12:7
uniform
52:20
unique 285:7
uniquely
36:5 219:1
unit 152:5
United 1:1
12:6
units 114:9
132:12
133:5,9
universally
158:23
University
59:19,21
73:10 74:8
103:16,24
205:21
207:1
unmarked
211:10
unpatent...
300:14
unwashed
105:16
usable
143:18
144:14,21
use 43:18
44:1,16
45:1 51:12
51:14
53:11,23
53:24
54:11,12
73:19 91:8
91:18
92:13
96:24
104:19
105:12
115:25
117:6
138:24
141:24
142:16,21
148:6
153:14,19
154:11,16
157:15
168:22
173:6
187:5
209:25
210:1
232:23
233:7,15
234:7,23
237:12
243:3
263:2,8,19
263:23
264:3,7,14
265:3
266:14,18
266:21
268:7,12
268:18
270:1
272:17
273:17,24
284:1
user 44:13
44:18
74:14
112:13,24
136:17,17
136:21
137:6
138:3,15
138:25
139:3
140:19,23
140:25
150:25
167:22,25
168:2
169:1,2
170:1,8
179:24,25
180:1,25
181:2,2,8
181:14,20
203:5,12
212:6
216:16,23
217:3,11
243:6,7,8
243:8,9
244:4
253:12,17
253:17
275:5,7,15
275:17,22
275:23
276:4,4,22
277:2,8
278:9
279:3,7
292:24
293:1,13
293:16,18
294:4,6
user's
239:11
users 169:20
170:11
201:11
239:7,11
243:4,10
uses 168:19
177:4
178:20
187:1
233:17
USPTO 32:1
32:13 33:1
33:11,17
34:13,16
usual 108:20
Utah 11:19
11:21 12:1
12:2

V

V-i-v-i-...
287:8
valid 6:12
6:15,15
validity
29:9
300:20
vanilla
53:24
54:13
71:19
273:17
variable
142:3
variety 62:7
107:20
148:6
153:23
various
150:23
261:17,24
Venable 2:2
4:22,24
verify
251:13
versa 258:11
version
112:6
172:9,23
175:23
176:5,7,10
177:25
178:7,12
179:1,2,11
179:14,15
179:16
181:23
182:22,23
183:18,22
183:24
185:13,15
186:6,9,12
187:13,15
187:17,18
187:19,21
188:7
189:25
190:1,11
190:12,15
190:24
191:1
202:21,23
203:2,3,6
203:18
204:24,24
205:8,10
205:11
206:1,2,3
206:13,15
206:16,25
207:7,20
208:2,2,5
208:5,6,10
208:12,17
208:18
209:3,3,7
209:25
210:1,18
210:19,20
210:21,25
276:23,24
277:1
278:9,9

279:6
293:21
294:8
297:14
298:12
302:11
versions
171:7,12
171:20,25
172:13,19
174:21
175:2,10
175:19
176:2,14
176:14
178:3,9,15
178:16,18
178:22,23
182:10,13
182:20
183:3,15
183:21
208:15
210:1,13
212:6,8
versus 4:8
6:2 109:3
123:5
138:12
VGA 180:12
vice 258:11
video 2:25
4:13 47:23
47:24 48:5
48:8,9,13
48:13 49:2
49:2 50:23
52:8,19
53:21 54:9
56:11
57:12,17
60:3,6,19
60:20 64:3
64:6,7,10
64:23 65:8
65:9,13,17
65:22 66:1
66:21 67:1
67:23
68:21
69:24 70:9
70:15,17
70:24 71:3
71:12,16
71:25 72:8
72:13,21
75:5 76:11
78:22 91:7
91:17
92:12,25
93:3,15
95:19,23
96:7,15
97:4,15,25
98:4 99:5
99:21,24
100:8
101:18,23
101:24,25
102:3,7,18
102:21,25
103:1
106:11
108:15,15
109:13
110:1,15
112:9,12
112:14,18
112:22,24
113:1,4,6
113:9,10
113:14
116:3
119:2
120:5
121:2,3,8
121:16,19
122:3,16
124:3,16
125:11
126:10,16
126:24
127:2,6,9
127:13,16
127:18,19
131:14,14
131:18,19
133:22
134:1,7,8
134:17,18
134:23,25
135:1,2,3
135:4,16
135:22
136:15,16
136:19,21
137:3,5,7
137:25
138:9,12
138:12,21
138:22
139:8,14
139:21,22
140:4,8,9
143:6,18
144:14,21
146:21,24
147:18,21
147:23
148:7,11
148:20
149:1,7,15
149:21,24
149:25
150:1,10
150:23
151:11,12
151:15,15
151:18,18
151:23,24
152:3,5,8
152:23
157:21
158:14,24
158:25
160:20,21
160:25
161:4,9,11
161:13,14
161:23,24
162:2,9,13
162:14,18
162:19,21
162:25
163:2,7,14
163:18
164:9,9,11
164:11,13
164:20
165:4
166:24,25
167:4,8,9
167:22
168:6,25
169:10,18
169:25
170:6,10
170:15
172:10,14
172:16,16
172:20
173:15,17
173:20
174:1,11
174:15,21
174:24
175:3,4,6
175:7,7,8
175:10,19
176:2,5,11
176:12
178:25
179:1,3,12
179:14,15
179:21
180:2,8,9
180:13,15
180:15,17
181:1,8,13
181:23
187:14,20
188:8,9,23
189:2,5,7
189:9,13
189:14,14
189:18
190:1,3,5
190:6,12
190:17,19
190:21,25
191:2,7,8
191:9,10
191:11,14
191:16,24
192:2,5,11
192:12,13
192:20,22
192:23
193:4,5,7
193:10,20
193:21,24
193:25
194:7,8,13
194:13,20
194:21,23
194:24
195:4,21
195:22
196:9,9
198:18
199:17,23
202:13,14
202:17,22
203:2,5,6
203:10,18
203:20
204:3,4,7
204:7,8,8
204:20
205:3,4,5
205:9,15
205:16,17
205:22,22
206:1,2,14
207:6,7,13
207:15,17
207:19,20
207:24,25
208:5,6,7
208:8,10
208:12,15
209:3,6,7
209:8,25
210:10
212:5,18
213:24
214:3
215:22
239:5
243:17
267:10
275:22,23
279:4,6
280:8
282:25
283:7,10
283:15
284:22
288:21
289:10,14

289:22
290:10,25
291:14
292:24
293:8,11
293:11,20
295:7
297:15,17
298:13
video's 152:10
video-re... 4:6
video.MS... 290:25
video.ms... 288:8,11
288:16
289:14
290:14
291:5,14
videocon... 111:22
videogra... 2:17 4:2
4:11 59:2
59:6 145:9
145:15
198:3,7
248:12,16
298:23
299:4
300:4,8
301:17,21
videos 60:8
208:3,18
208:25
209:13,15
210:19
267:10
287:11
view 27:6,14
33:16
44:13,19
128:22
228:20
264:18
267:24
viewer 218:2
223:14,14
223:19
239:22
241:12
242:11
viewer's 240:1,11
240:23
viewers 241:23
242:12,13
242:15
viewers' 243:18
viewing 216:14,22
217:8
239:12
243:19
275:18
virtual 40:24 41:3
41:8,21
42:14,17
42:23 43:3
44:11,17
45:12
249:2,4,6
249:13
250:7,24
251:12,17
251:21,25
252:2,5,5
252:8
253:11,16
257:5
258:3,4,6
269:18,21
269:25
270:12,16
virtually 243:4
Virtue 269:12
visiting 74:5
Vividas 287:8,18
voice-ov... 148:11
vs 1:5
VT 44:11

W

W-i-l-l-... 76:22
wags 242:21
want 15:16
23:8 58:19
88:2 94:13
94:14
103:13
126:9
128:4,13
129:21
130:10
136:6
153:8
162:21
163:25
164:25
231:12,17
235:1
237:18
248:9
282:21
294:10
295:23
302:14
wanted 24:8
24:11,13
51:20
105:15,15
208:14,16
209:11,12
241:8
Washington 1:15,22
4:16
wasn't 17:1
17:2 31:19
54:3
125:18,23
259:18
277:23,23
290:18
watch 62:21
120:7
207:15,23
276:19
277:9
278:16,22
watched 205:17
207:14
275:5,15
276:22
watching 138:25
140:19,23
141:1,5
181:1,20
275:22
292:24
293:13,17
294:5
way 25:13
26:16
71:22 82:3
88:23
106:8
115:17
126:24
131:15
133:25
135:4,12
136:3,23
136:24
137:18
139:19
145:6
152:7
161:5
179:10
215:9
217:10
241:8,10
266:16
276:10
286:15
288:23
303:11
ways 75:17
105:6
144:7
We'll 58:12
88:9
250:20
299:19
we're 108:1
110:6
132:3
186:16
198:4,8
235:12
242:8
245:13
248:13,17
277:17
278:15
284:7
293:21
298:24
299:5
300:5
301:24
we've 58:17
83:12
86:10
94:12
131:23
141:8,16
197:22
213:22
248:7
297:22
web 51:3,12
51:14 53:5
53:11,12
53:24
54:13
92:25 93:4
93:22
94:10,21
96:14 97:3
98:25
158:22
212:10
214:9,14
214:19,24
215:1,5
244:21
246:21
247:17
248:4
249:9
253:11,15
258:3,4
263:4,4,9
263:24
264:8,16

265:4
267:13
273:17
weekend
259:6,9
280:13,18
well-known
27:23
261:19
262:1
went 289:3
289:13,21
290:4,23
292:14
weren't 67:5
131:18
West 2:3
whatsoever
57:16
82:14
white 2:17
4:10
280:25
widely
143:19
144:14,21
157:23
158:18
widespread
157:15,22
158:18
Willebeek
76:22,23
76:25 77:2
77:3 79:2
79:5,10,11
79:14 80:3
80:18,25
82:25
83:15,25
84:3,11,17
84:17 85:3
85:3,11,12
85:16,21
85:24
90:23
willful 92:6
Williams
2:12 5:5
15:19
299:18,25
300:1
Wilson 2:11
3:7 5:1,1
7:3 13:7
13:15
14:14
15:19
25:10,19
26:14
28:22
33:18
34:19 35:2
36:23 39:1
40:15 41:9
45:4,25
46:12
52:13
54:14
55:19 58:5
58:17
61:17
68:23 69:7
69:11
72:15 75:1
77:9,21
79:16
81:11,22
82:17 83:7
87:1,24
89:6,23
90:16 95:4
95:20 97:5
109:9
110:21
115:11
120:13
122:23
130:2
137:9
138:4,13
140:10
141:2,8
146:4
147:25
159:23
174:12
175:11
180:3
184:20
192:14
194:15
197:15,22
198:1
200:24
201:7
202:24
203:23
206:5,17
207:9
209:16
210:3,22
218:9
223:6
224:3,13
225:19
226:5,23
228:9,13
228:16
229:5,9
241:14
242:2,17
252:15
254:4,24
255:13
256:12,23
257:12,22
258:15
266:9
268:20
270:7
271:24
272:13
273:4,8
275:9,19
277:4
278:12
279:9
281:14
285:22
286:9
289:15,23
291:1
298:14
299:11
300:11
301:15,19
302:14
win 266:22
wish 304:2
witness 1:19
3:2 5:8
7:5 8:20
13:9,16
14:16 23:2
25:12,20
26:15
27:20
28:24
33:20
34:21 35:3
36:25
38:14 39:3
40:17
41:11 45:6
46:2,14
47:21 48:7
52:15
54:16
55:21 58:6
58:21 59:1
59:18
61:19
62:15
63:22
66:11
68:25
69:11,13
72:17 75:3
77:24
78:19
79:18
81:13,23
82:19 87:3
88:1 89:8
89:25
90:20 91:2
93:10 95:6
95:22 97:7
98:9,13
99:12
109:11
110:23
115:13
120:15
121:22
122:25
126:4
130:4
137:11
138:6,15
141:4,13
143:9
146:7
147:3,12
147:15
148:2
151:7
153:2
156:3
159:7,25
160:17
166:7,10
167:18
174:14
175:13
180:5
184:22
188:13,17
192:16
194:17
196:20
197:17
198:2
201:1,9,20
203:1,25
206:7,18
207:11
209:18
210:5,24
211:13
218:13
222:14
223:8
224:5,14
225:21
226:7,25
227:22
228:20
229:11
231:14
238:20
241:16
242:4,19
248:11
251:6
252:17
253:7
254:6
255:1,15

256:14,25
257:14,23
258:16
262:22
265:8
266:11
268:22
269:9
270:9
272:15
275:11,20
277:6
278:14
279:11
281:15
282:3,17
285:24
286:10
289:17,25
291:3
298:16
299:10,17
301:14,16
won 73:2
word 10:8
44:17 45:1
168:20,22
173:6
187:2
216:14
283:18
worded
247:20
words 28:19
168:17
176:25
177:19
185:9
186:24
196:7
241:3
245:2,4,9
245:11
246:1
251:12
work 6:15,17
6:20 7:19
14:6 48:10
63:23 67:3
67:3,5,7
68:17
70:17
72:20 74:6
76:5,10,17
93:20
101:18
102:3,7
105:11,16
105:19
108:23
126:7
130:9
150:5
174:5
179:5
267:5
268:12,13
283:16,24
284:1,2,19
worked 7:15
7:18 13:1
52:18 56:6
71:20
91:23
100:22
103:23
105:1,17
112:17
145:6
153:23
154:15
276:11
283:14,19
working 22:3
68:1 70:12
70:16
108:11
118:25
119:5
283:22
works 213:13
213:16
world 118:6
128:22
wouldn't
208:19
209:8,24
241:9
267:24
276:6,12
276:20
wow 52:1,3,5
54:5
write 225:6
writing 20:1
written
172:11
wrong 181:25
222:25
236:6,21
wrote 31:2
127:12
128:17
WWW 98:17

X

Y

yeah 6:22
10:18 57:1
71:13
126:24
128:2,5
138:6
140:21
144:8
148:4
151:2
165:12
185:8
186:2
192:16
194:18
207:3
250:7
252:17
259:20
269:25
year 18:12
years 52:2,3
79:22
89:13
108:10
116:11,13
123:2
149:2,8,11
149:12
yesterday
16:9,10
York 2:3,3

Z

Zoom 2:12,19
2:20 16:4
16:7
102:13

0

1

1 1:16 3:8
4:4 22:25
45:14
57:23,24
58:2 59:16
59:16
162:10
167:16,20
168:16
188:21
191:23
202:23
203:2,3,6
204:24
206:15,16
206:25
207:20
208:2,10
208:12,18
209:4,7,25
210:19,20
210:25
215:18
238:3
259:10
281:23
301:23
1:24 198:5
1:26 198:4
1:34 198:6,8
10 3:17
114:14
187:25
188:6
224:9
231:6,13
231:18
232:3,17
234:10
236:10,12
236:22
237:3
250:9,12
281:10,15
10,469,544
1:11
10,469,555
1:13
10,951,680
1:12
10:07 59:2,5
10:16 59:5,6
100 200:5
242:13,15
100-kilobit
200:6,14
1001 2:12
165:17,19
215:19
10036 2:3
1004 167:13
167:13
211:3
245:15
1005 235:5
238:6,7
101 2:7
102 159:6,9
159:13
11 66:4,9,14
67:7 68:14
221:2
222:23
280:21
282:20
11,470,138
1:10
11,677,798
1:9
11:56 145:10
145:14
110 3:12
12 73:5,8
101:15,17
143:8,11
169:7
251:2,4,10
251:20
253:18
296:20
12:19 145:14

145:16
120 238:13
124 224:24
224:25
225:1
13 102:6
103:3
104:10
121:14
137 210:8
138 9:18
34:2,9,18
35:21 42:7
43:7,11
44:9 45:17
66:6 153:8
160:12
162:11
164:7
165:20
166:2
170:25
202:1
215:20,23
216:1
217:6
218:25
225:3
226:20
230:9
232:1
234:3,13
235:9,12
235:13,18
235:24
236:4
244:14,15
244:16,17
245:2,19
245:21
246:4,17
246:20
247:2
250:11
251:11,18
253:2
14 221:2,3
225:2,12
231:25
234:3,5,6
234:7,9,11
234:12,18
234:18,19
234:19
235:8,14
235:15,21
235:23
141 248:19
248:23
249:1,19
142 98:8,11
145 3:13
15 5:21,22
62:12
135:19
136:15,20
137:6
149:2,7,11
298:8
150 298:8
151 2:3
16 216:4,6
219:2
16-by-9
293:10
294:25
295:2
296:13
16-minute
207:13
165 3:14,15
17 166:19
286:18,21
287:7,22
185 274:6,7
274:8
19 116:10
166:20
238:22
294:16
296:19
298:7
1980s 66:18
66:23 67:5
67:12,15
70:22 71:1
71:23 72:2
72:4
1990s 47:25
48:5 50:20
59:19
62:16,20
102:21
153:24
1991 73:8
74:24
1992 67:21
68:2 70:15
71:10,15
75:6,21
149:13,15
150:8
1993 67:22
68:2 70:15
1994 63:1
1995 69:6
70:6,9
1997 64:10
64:23 65:6
65:12,24
65:25 66:1
110:13,17
112:8
113:23
114:4,11
114:13
116:1,4,5
116:7,24
117:4,9
118:15,21
119:11
127:12
128:17,21
129:9,25
132:17,24
134:22
137:3,19
142:15,20
143:1,23
144:12,19
145:1,3
170:4
174:9
1997s 65:8
1998 79:6
92:20,24
93:2,12,21
94:9,20
95:3,16
98:16,23
99:4
1999 155:18

2

2 3:9 28:7
28:11,17
60:23,24
61:25
62:13
63:20
119:6,8
126:1,3
167:16,20
168:16
169:7
176:23
177:9,16
177:23
179:19
182:3
184:3
185:7
186:17
187:24
188:5
202:21
204:24
206:3,13
208:2,5,5
208:6,18
210:1,19
261:12
275:1,2,3
275:16
279:20
280:20
282:12,13
2.4 295:7,12
295:12,23
298:19
2:43 248:14
2:45 248:13
2:57 248:15
248:17
20 5:21,22
10:22
156:2,4,10
200 2:13
166:21,24
200:13
2000 52:9
158:2,7
2000s 47:25
48:6
157:21
158:1,8,11
158:13
159:3
2001 8:8,10
8:23 21:5
21:17,25
22:4,13,16
22:22 23:1
27:19 28:7
37:7 39:16
40:23
300:24
301:9
2004 117:10
117:12,24
117:25
118:15
119:11
120:10,12
158:2
259:11
261:23
263:25
264:6,7
2005 261:8
261:10
2006 42:1,3
47:9 58:16
59:13
64:13 66:5
73:6 101:9
153:6
160:10
224:23
244:9,11
248:24
274:4
300:16
2007 147:8
148:2,5
149:11
157:14
280:22
201 3:16
2010 158:7,8

158:9
2011 258:19
260:20
265:21
266:1
269:1
2012 51:19
292:5,5
294:17
296:2
2013-ish
51:19
2016 24:13
49:9,16
50:6,14
51:10 52:9
55:15
153:18
2016-2017
150:15
2017 47:3
49:10,14
49:16 50:6
50:14
51:11
55:16
153:18
2018 47:3
49:14
2020 10:23
15:6
2021 10:23
2022 92:16
92:23
98:21 99:2
99:9
2024 1:16
4:4 118:9
118:10,15
119:11
301:23
304:23
2028 303:21
2059 280:7
281:11
286:19
206 153:9
170:23
22 28:2 94:1
94:25
227:9,10
227:10
220 288:8,21
220-kilobit
288:17
23 59:12
225:3,12
232:1
234:3,5,13
24 213:2
238:19
2400 295:17
295:24
297:6
25 213:2
250 3:17
26 29:18
30:4,7,12
27 31:10
37:6 213:3
28 225:3,12
232:1
234:3,5,13
2C 211:14,16
211:20,21
211:25
213:17

3

3 3:10 8:19
8:23 9:2
77:6,7
78:12
90:12,19
91:25
111:5,11
112:1
120:25
130:14,17
134:10
166:5
187:25
188:5
3-by-4
294:25
3:54 299:2
3:56 298:24
30 6:20 7:10
108:10
116:10,13
135:16,22
136:15,20
137:5,25
138:10
139:1,8
140:23
227:9,10
227:13,21
297:7
303:21
30-frame
138:11
30/70 6:2
300 3:7
304 219:9
31 251:2,4
251:10,16
251:20
253:18
310-1769
2:25
32 296:20
3212.218...
2:4
33 139:11
216:4,6
227:9,13
227:21
340 34:5,10
34:11,15
35:20
36:21
35 216:5,6
3800 2:7

4

4 3:11 83:4
83:5
141:15,21
201:18,23
202:3,4,22
204:23
206:4,14
207:20
208:6
4-by-3
296:13
4.3 296:13
4:09 299:3
4:12 299:5
4:13 300:5,6
4:27 300:7
4:29 300:9
4:31 301:23
302:18
40 39:9,13
64:13,19
147:1,6
41 38:12,16
38:22
45:11
152:12,14
415.343....
2:8
42 40:23
41:2,24
42:10,13
42:16 98:7
151:6,10
152:15,18
152:21,25
219:3
42nd 2:3
43 43:1 44:8
251:2,5,10
251:16,21
253:19
44 45:11,14
444 47:14
49:20,23
50:2,6,10
50:15,21
51:12,16
52:10 53:5
54:7,20
55:7,13
56:3
150:15
159:17,20
159:25
160:4
45 45:15
177:16,18
177:23
219:3
46 47:8,14
47:16 49:5
50:18 55:4
55:13
47 153:1,5,9
153:12
48 58:14
49 177:17,18
177:23
182:3,4

5

5 3:4,12
110:6,7,10
110:13
120:25
126:2
141:16
201:23
202:5
5,892,754
74:11
50 147:11,13
150:3
50,000 63:13
508 211:20
211:25
516 212:13
212:16
213:18,19
213:21,23
214:2
524 214:5,7
214:13
528 214:23
214:25
53 160:14,15
160:20
161:2,8,12
162:5,7
532 215:3
548 212:22
212:23,24
213:5
214:4
215:10,13
55 166:5,8
182:3,4
184:3
185:7
552 213:6
215:13
555 230:18
230:18,21
230:24

231:2,7
232:4
235:11,19
235:22
236:10,13
237:3,22
557 146:17
146:20
147:7,20
148:21
149:3,8,13
159:22
160:4,6
56 164:3,4
165:9
560 213:6
215:13
57 3:8

6

6 3:13,19
27:18,22
145:22,23
145:25
147:2
154:17
160:9
167:17,20
168:16
244:17,20
245:14,19
245:24
246:4
247:6,12
247:16
262:11
6,389,473
156:18
60 3:9
154:19
155:4,8,10
155:11,21
166:6,9
600 44:11
61 78:17,17
78:21 80:2
80:24
155:2
157:8,19
176:23
177:9
184:3
185:7
186:17,20
186:23
64 114:10
650.739....
2:14
652 61:15
62:9
66 176:23
177:1,9
186:17
187:24
188:2,5
6A 250:14,15
250:16,18
250:21,22
251:16,20
253:18

7

7 3:14 83:16
83:16,21
83:23
165:12,14
165:16,20
165:20
166:19
169:7
230:14,21
259:11
268:25
271:6
7,818,444
49:9
70 6:21,25
7:10,19
700 1:21
4:15
702 219:10
704 219:9
710 219:8
74 171:2,4
172:4
176:13
177:11
186:19
75 90:18,25
754 74:13
76 93:6,8
77 3:10

8

8 3:15
165:24,25
166:2,8
201:14
215:19,20
245:22
8,050,652
61:6
80 289:3
800 2:25
14:2
824 78:6
79:15 80:5
80:20
82:20,23
83:11,16
83:24 84:4
85:22
88:11,16
89:16,20
90:4,9
83 3:11

9

9 3:16 64:21
64:21
188:11,15
188:19,20
189:1,6,12
189:17,23
190:9,15
190:22
191:19,21
192:1,7,9
192:18
193:3,23
194:2,6,11
194:12
195:17,20
196:1
199:15
201:15,19
201:25
203:17,18
204:11,12
204:15
208:7,17
208:22
209:13,19
209:22
215:22
216:1,8
217:2
221:2
222:23
224:6,7,19
253:2,5,10
253:14,19
253:21,23
254:8,11
254:15,16
254:19,21
255:4,18
256:4,8
257:3
274:22,23
274:25
9's 205:25
207:5
9,742,824
77:16
9:06 1:22
4:3
900 216:9
904 217:20
218:3
906 218:6,19
908 218:22
219:1,7,14
219:17,19
220:2,10
221:11
910 219:9
220:16,18
220:23
221:7,13
222:4,9
223:3,17
914 220:25
221:9
222:11,24
223:5,13
916 221:14
221:16,20
918 221:24
92 67:19,20
71:8
93 67:19,20
94111 2:8
94304-1007
2:13
97 119:5
202:12