

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

COMCAST CABLE COMMUNICATIONS, LLC,

Petitioner,

v.

CASE IPR2024-00441

IPR2024-00442

ENTROPIC COMMUNICATIONS, LLC,

Patent Owner.

DEPOSITION OF

SAMUEL H. RUSS, PH.D.

Thursday, February 20, 2025

Mobile, Alabama

7:57 a.m. Central Standard Time

Reported By:

GRETA H. DUCKETT, CCR, RPR, CRR, CVR-S, RVR-M-S

JOB NO.: 10235

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February 20, 2025

7:57 a.m. Central Standard Time

Remote deposition of SAMUEL H.

RUSS, PH.D., at Homewood Suites by Hilton, 1388
West I-65 Service Road South, Mobile, Alabama,
and reported stenographically by Greta H.
Duckett, CCR, RPR, CRR, CVR-S, RVR-M-S.

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I N D E X

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SAMUEL RUSS,
the witness, having first been duly
sworn to speak the truth, the whole truth and
nothing but the truth, testified as follows:

EXAMINATION

BY MR. QUALEY:

Q. Good morning, Dr. Russ. I'm Paul
Qualey, from Banner Witcoff, representing the
petitioner Comcast Cable Communications, LLC.

A. Good morning.

Q. Can you state your name and address
for the record.

A. Sure. My name is Samuel Russ,
R-U-S-S, and my address is 13712 Tom Gaston
Road, Mobile, Alabama 36695.

Q. And is there any reason you can't
give your best testimony today?

A. Not that I'm aware of.

Q. And I believe you've been deposed
before; is that correct?

A. Yes, I have.

Q. So I'll keep my deposition
reminders brief since you've been through this
before. But I'll be asking you questions

1 today; you'll be providing answers. If you can
2 wait until I finish my question and I'll try to
3 wait until you finish your answer, the court
4 reporter will be much happier with all of us.

5 A. Understood.

6 Q. And if you don't understand a
7 question, please don't hesitate to ask me to
8 repeat it or clarify.

9 A. Okay.

10 Q. And now, during the course of the
11 deposition, your attorney may raise some
12 objections. Unless he instructs you not to
13 answer, you still need to answer my question.

14 A. Understood.

15 Q. And we'll take breaks during the
16 deposition. If at any time you need a break,
17 just let me know and we'll try to take one. If
18 there's a question pending, you'll need to
19 answer the question before we take a break.

20 A. Okay.

21 (Exhibit 2013 was marked for
22 identification.)

23 BY MR. QUALEY:

24 Q. I'm handing you a copy of
25 Exhibit 2013 from IPR 2024-0042, regarding

1 U.S. Patent No. 9,825,826.

2 A. Okay.

3 Q. Does that appear to be a true and
4 correct copy of the expert declaration you
5 submitted with regard to the '826 patent?

6 A. It does.

7 Q. And if I refer to this as the '826
8 declaration, you'll understand I'm referring to
9 that document?

10 A. Yes.

11 (Exhibit 2013 was marked for
12 identification.)

13 BY MR. QUALEY:

14 Q. And now I'm handing you a copy of
15 Exhibit 2013 from IPR 2024-00441 regarding
16 U.S. Patent No. 8,792,008.

17 A. Okay.

18 Q. And is that a true and correct copy
19 of the expert declaration you submitted with
20 regard to the '008 patent?

21 A. I believe that it is, yes.

22 Q. And if I refer to that as your '008
23 declaration, you'll understand I'm referring to
24 that document?

25 A. Yes.

1 Q. Now, what materials did you review
2 to arrive at the conclusions described in your
3 declaration?

4 A. I reviewed the '008 and '826
5 patents. I reviewed the prior art references.
6 I reviewed the declaration issued by Mr. Lett
7 and his deposition testimony. And if there's
8 something else listed in this report, also
9 that. I believe I also consulted, you know,
10 documents about the history of cable television
11 and things like that.

12 (Exhibit 1010 was marked for
13 identification.)

14 BY MR. QUALEY:

15 Q. Okay. Now I'm going to hand you
16 what's been marked as Exhibit 1010, U.S. Patent
17 application publication number 2010/0120386.

18 A. Okay.

19 Q. And we use the same exhibit number
20 in both proceedings so it applies to both IPR
21 proceedings.

22 A. Okay.

23 Q. Do you recognize this document?

24 A. Yes. It's what I believe we've
25 been calling the Konstantinos reference.

1 Q. And that's one of the prior art
2 references you reviewed?

3 A. Yes.

4 (Exhibit 1009 was marked for
5 identification.)

6 BY MR. QUALEY:

7 Q. And now I hand you what's been
8 marked as Exhibit 1009, United States patent
9 application publication number 2005/0114879.
10 And this is another one of the prior art
11 references you said that you reviewed?

12 A. Yes. This is what we've been
13 calling the Kamieniecki reference. And for the
14 record, that's K-A-M-I-E-N-I-E-C-K-I.

15 (Exhibit 1011 was marked for
16 identification.)

17 BY MR. QUALEY:

18 Q. All right. And now I will hand you
19 what's been marked as Exhibit 1011, United
20 States Patent No. 8,649,421. And is this
21 another one of the prior art references that
22 you reviewed in preparing your declarations?

23 A. Yes. It's what we've been calling
24 the Renken reference.

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(Exhibit 1012 was marked for
identification.)

BY MR. QUALEY:

Q. Now I'll hand you what has been
marked as Exhibit 1012, which is a United
States provisional application number
61/444611.

Do you recognize this document?

A. Yes. This is a provisional
application for the Renken patent.

Q. And that's another one of the
pieces of prior art you reviewed in preparing
your declarations?

A. Yes. And it's also listed on the
face of the Renken patent, the application
number.

Q. Dr. Russ, when were you first hired
to work on your '008 and '826 expert
declarations?

A. Sometime last year. Sometime in
2024.

Q. Okay. Do you recall with any more
specificity?

A. Maybe in the summer. I don't -- I

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don't know.

Q. And approximately how many hours
did you work on the '008 and '826 declarations?

A. A few dozen hours, I would say.

Q. And did you prepare for today's
deposition?

A. Yes, I did.

Q. And when did you prepare?

A. The day before yesterday and then
another conference call maybe a week before
that. And then in between, conducted my own,
you know, read-through of these various
references.

Q. And did you meet with anyone in
preparing?

A. Yes. I met with counsel.

Q. Counsel who is here today?

A. Yes.

Q. And approximately how much time did
you spend preparing?

A. 12 to 20 hours. I don't know.
Again, maybe a small -- dozens of hours.

Q. And did you discuss your
declaration with anyone other than counsel?

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A. No.

Q. Now, I want to talk a little bit about your educational and work experience. Your CV is attached to the declaration, so feel free to refer to it as needed.

A. Okay.

Q. So can you provide your educational background starting post-high school?

A. Sure. I graduated from Georgia Tech in 1986 with a bachelor's of electrical engineering. I graduated with a Ph.D. from Georgia Tech in 1991, also in electrical engineering.

Q. What was your thesis on for your Ph.D.?

A. It was on computer architecture, or the design of computers.

Q. And what did you do after completing your Ph.D.?

A. My first job out of the Ph.D. program was at a start-up company named Dickerson Vision Technology.

Q. And what did you work on at Dickerson Vision Technology?

1

2 A. I worked on machine vision. I
3 developed machine vision systems and I wrote
4 the user interface software and developed a
5 manufacturing plan for the company.

6 Q. And that was -- I'm looking at your
7 CV. That was in 1992 to '94?

8 A. Correct.

9 Q. And what did you do after leaving
10 Dickerson Vision Technologies?

11 A. From 1994 to 1999, I taught at
12 Mississippi State University. I taught classes
13 in computer design and digital logic and
14 circuit board design. And I conducted research
15 on network workstations.

16 Q. In your CV, it makes reference that
17 you were a thrust leader at Mississippi State.
18 What is that exactly?

19 A. Good question. We had an
20 engineering research center at the time. In
21 the world of NSF -- in the world of the
22 National Science Foundation, an engineering
23 research center is extremely prestigious. And
24 so we had one at Mississippi State.

25 The internal organization was

1
2 organized in what were called thrusts. Like,
3 there was a thrust for, I don't know, aerospace
4 and a thrust for different things. So I was a
5 leader of the computing thrust at the
6 engineering research center at Mississippi
7 State.

8 Q. And what did you do after leaving
9 Mississippi State?

10 A. I worked for -- I moved back to
11 Atlanta and worked for a company named IVI
12 Checkmate and worked there for about a year.

13 Q. And what did IVI Checkmate
14 do? Strike that.

15 What did you do at IVI Checkmate?

16 A. IVI Checkmate made point of sale
17 retail terminals like credit card readers, and
18 I developed a touch-based system for handling
19 credit cards and debit cards.

20 Q. And after you left IVI Checkmate?

21 A. So from 2000 to 2007, I worked at
22 Scientific-Atlanta. In the middle of my work
23 there, they were bought by Cisco. That was the
24 company that I worked for.

25 Q. Is it okay if we refer to it just

1
2 as Scientific-Atlanta? I know they became
3 Cisco in 2006-ish probably.

4 A. I unambiguously think of it as
5 Scientific-Atlanta. Yes. I certainly
6 understand.

7 Q. And what did you do at
8 Scientific-Atlanta?

9 A. I was originally hired to explore
10 new technologies for the company, and I did
11 that for a while. I then transitioned to
12 manage a set-top box design group, and then I
13 took on the role of person in charge of a
14 program to increase the reliability of DVR
15 set-top boxes.

16 Q. Let's start with -- the first one
17 you said was researching new technologies or
18 exploring new technologies?

19 A. Right.

20 Q. What did that involve?

21 A. I was originally tasked with
22 exploring home networking technologies, the
23 idea being that perhaps we could incorporate
24 home networking into our set-top box products.

25 For example, we conducted a

1
2 demonstration of streaming live television in
3 2000, which at the time was -- sounds routine
4 now, but at the time, that was breaking the
5 sound barrier. And that was actually the
6 source of some of my first patent applications
7 at Scientific-Atlanta.

8 Q. And how long did you do that?

9 A. It was probably for a couple of
10 years. I think it was in 2002 when I
11 transitioned to being a set-top box design
12 manager.

13 Q. And in the time you were working on
14 the new technology role -- if I can call it
15 that.

16 A. Sure.

17 Q. Were you working on -- did you work
18 on any actual set-top boxes, or was it all kind
19 of prototype work, for lack of a better word?

20 A. That part of the work was prototype
21 work. We were looking for things that we could
22 add to set-top boxes.

23 Q. And home networking was one of
24 them. Were there any others that come to mind?

25 A. It was almost -- it was -- nearly

1
2 all the work had to do, one way or another,
3 with home networking.

4 Q. And so then you said you
5 transitioned to being a set-top box design
6 manager?

7 A. That's correct.

8 Q. So how long did you do that?

9 A. I had that role the rest of the
10 time I was there. Now, in addition to that
11 role, they added other things to my plate, but
12 I was a set-top box design manager the whole
13 rest of the time I was there.

14 Q. And how many set-top
15 boxes -- strike that.

16 How many models of set-top boxes
17 did you work on?

18 A. There was the Explorer 4200, the
19 8300, the 1840, and the Comcast RNG. To my
20 recollection, there were four.

21 Q. Is the RNG an acronym for
22 something?

23 A. It was a prototype for Comcast. I
24 think Comcast -- it was explained to me that it
25 stood for real next generation. It was

1
2 Comcast's internal name for it. I left the
3 company before that model went to mass
4 production.

5 Q. Do you know by chance what -- do
6 you know if it got a different name once it was
7 actually released in mass production?

8 A. I don't know.

9 Q. And then you said you worked on
10 DVRs. So that was one of the additional
11 responsibilities that was added on to your
12 set-top box design manager role?

13 A. Yes. In addition to my work on
14 multiroom, I also worked on DVR reliability.
15 There were actually two extra DVR
16 responsibilities. I apologize. I forgot to
17 mention multiroom earlier.

18 So we worked on multiroom DVR,
19 which was actually another home networking
20 feature and then we later worked on -- I worked
21 on DVR reliability.

22 Q. And reliability in what sense?

23 A. Improving -- well, I'm trying to
24 think how to word it. Lowering the failure
25 rate of hard drives in DVR set-top boxes.

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2 Q. And so when you were working in
3 set-top box design, I guess, how often was
4 Scientific-Atlanta releasing new models of
5 set-top boxes?

6 A. I would guess every 18 months.
7 Eighteen months to two years.

8 Q. And when a new set-top box was
9 released, would that replace the previous
10 model, or would they be continuing to sell
11 previous models as they sold the new box?

12 MR. FULLER: Objection to
13 form.

14 A. They would -- sort of a little bit
15 of both. A new model was always kind of --
16 there's always a transition period when we were
17 switching from the old model to the new model.

18 Q. Okay. So, like, for example, you
19 said you worked on the 4200. Did that replace
20 a particular earlier model?

21 A. Well, that one was an exception.
22 We were replacing a different vendor.
23 Cablevision was switching from Sony to
24 Scientific-Atlanta. So for us it was a
25 greenfield. It was a -- we're selling a

1
2 product to a customer that had not bought our
3 products before.

4 Q. And so was the 4200 exclusively
5 sold to Cablevision?

6 A. My recollection is that it was.
7 It's possible it was sold to somebody else. I
8 know that Cablevision was the primary customer
9 for it.

10 Q. And another box you mentioned was
11 the 8140. Was that replacing another box?

12 A. I'm sorry. I think you meant 1840.
13 There was an 8300 and 1840 so I'm trying to
14 figure out which one.

15 Q. Sorry. It was 1840. I just wrote
16 it down wrong here on my pad.

17 So the 1840 -- well, actually,
18 let's step back. You mentioned the 4200, the
19 8300, and the 1840. Was that the sort of
20 correct order, you know, timewise?

21 A. That's my recollection as to the
22 chronological order.

23 Q. All right. Let's go back to the
24 8300. Did the 8300 replace an existing set-top
25 box model?

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2 A. Yes. It replaced the Explorer
3 8000.

4 Q. From what you said before, there
5 was a transition period that the Explorer 8000
6 would have been continued to be sold?

7 A. I guess the way I would put it is
8 it's possible. You know, once we released a
9 product to mass production, it was completely
10 up to the factory and the salespeople and all
11 that as to when something was actually being
12 sold. We sort of lost visibility on that. I
13 assume there was some transition period.

14 Q. And what about the 1840? What
15 model did that replace?

16 A. It was in the same family as the
17 Explorer 2000 family members. I think it was
18 actually produced at the same time as other
19 Explorer 2000 family members. I think it was
20 in addition to the catalog, not replacing
21 something. I think. Again, I don't know.

22 Q. Can you explain what a family
23 member is?

24 A. The Explorer 2000s and Explorer
25 3000s were our single-tuner, single-output

1
2 set-top boxes. So some were HD, some were SD,
3 but those were the base models.

4 Q. And so there were, I guess,
5 different family members in the Explorer 2000
6 group that had -- would they get a different
7 model number if it was an SD box versus an HD
8 box?

9 A. They had the same number, they
10 would just tack HD onto the end. But it would
11 be, like, 3200, 3250, 2200, 2100. They all had
12 numbers like that. I'm not sure why mine was
13 downgraded to 1840, but it was, I think. And
14 even then, actually I didn't -- I only --
15 anyway, yeah. That's the deal.

16 Q. Usually you want the numbers to go
17 up, not down.

18 A. Yeah.

19 Q. So what was the difference between
20 the 1840 and the other family members?

21 A. To my recollection, it was smaller,
22 physically smaller. And then -- I don't --
23 actually, I don't remember what the
24 distinctives were, just that it was slightly
25 smaller than the 2200.

1

2 Q. And once -- I guess you talked
3 about boxes being released to mass production.
4 Were there ever design or component changes
5 made after it was released to mass production?

6 A. Yeah. Sometimes.

7 Q. And what kind of changes?

8 A. Well, there was one case where
9 literally the factory that made the part burned
10 down, so we had to replace it with a different
11 part. Thankfully, that's incredibly rare.

12 A component might become obsolete
13 and you have to replace it with a different
14 component, like maybe a power supply component
15 or something.

16 Q. And for those models, would the
17 costs go down during mass production?

18 A. Yes. I mean, that was always our
19 goal. And the procurement department was
20 always trying to get the vendors to sell us the
21 components for lower prices.

22 Q. And would those savings be passed
23 on to Scientific-Atlanta's customers?

24 MR. FULLER: Objection to
25 form.

1

2 A. I have no idea.

3 Q. Not your department?

4 A. Not my department.

5 Q. And actually, maybe we should
6 clarify. Scientific-Atlanta's customers were
7 cable network providers, correct?

8 A. Yes. It took me a while to learn
9 the lingo. But when we say "customer," we
10 normally meant large cable company.

11 Q. Scientific-Atlanta was not selling
12 boxes to home consumers.

13 A. Right. Well, I think we tried at
14 one point. We refer to the end user as
15 subscribers. That was the terminology we used.

16 Q. Now, if I can refer you to your
17 '008 declaration. In paragraph 9, you say one
18 of the things you did was made major
19 improvements to then-existing set-top boxes.

20 Can you explain what you mean
21 there?

22 A. Well, probably what I had in mind
23 was the Explorer 8300, which we made design
24 changes to that unit to lower the hard drive
25 temperature greatly. And so that was an

1
2 example of an improvement we made. Yeah.

3 Q. And was that -- once the
4 improvement was made, was it still the same
5 model number, or had it been a different model
6 number before you made the improvement and then
7 it became the 8300?

8 A. We were tasked with developing the
9 Explorer 8300, which we knew was going to
10 replace the 8000 eventually. But we
11 incorporated design changes into the 8300 while
12 it was being designed so that the result was a
13 better product.

14 Q. Okay. What was the issue with the
15 hard drive temperature? Was that a -- it's a
16 known problem?

17 A. Yeah. Yes. In the DVR industry,
18 hard drive temperature is a known problem. So
19 our goal was to make the temperature as low as
20 possible. And we -- and our business unit
21 president wanted our DVR set-top boxes to have
22 no fans, and so we achieved a 20-degree
23 reduction in temperature with no fan.

24 Q. And that improvement with the no
25 fan, was that something that then

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Scientific-Atlanta marketed to its customers?

MR. FULLER: Objection to
form.

A. I assume so. I don't know.

Q. And Scientific-Atlanta had
competitors in the set-top box market, correct?

A. I would say it had a competitor in
the set-top box market.

Q. And who was that competitor?

A. Originally called General
Instruments, and they were owned by Motorola at
the time I was there.

Q. So it was largely a two-competitor
market?

A. Yes. In fact, I think I referred
to that in our report. We called it the
duopoly.

Q. So Scientific-Atlanta was competing
with Motorola to sell boxes to the cable
network providers?

A. Yes.

Q. And one of the ways
Scientific-Atlanta competed was based on the
features of the boxes?

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MR. FULLER: Objection to
form.

A. I assume so, yes.

Q. And did Scientific-Atlanta keep
track of the features that Motorola was
offering in its boxes?

MR. FULLER: Objection to
form. Objection to scope.

A. I assume so. I mean, I like to
think we were leading and they were following,
but I don't know.

Q. Did the cable network providers --
did Scientific-Atlanta's customers have -- did
they come to Scientific-Atlanta with certain
requirements that they wanted for their set-top
boxes?

A. Yes, definitely.

Q. And then Scientific-Atlanta met
those requirements?

A. Yes.

Q. Because if Scientific-Atlanta
didn't meet the requirements, you weren't going
to sell them set-top boxes?

A. Yes.

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Q. And did those new requirements sometimes drive up the cost of the boxes?

A. I suppose so, yes. I think the other way to think about it is it drove up the challenge of designing the set-top boxes. But yes, maybe.

Q. And would Scientific-Atlanta be selling more than one model of set-top box to a customer at a given time?

MR. FULLER: Objection to form.

A. Well, if by "model" -- I mean, we normally would have like a standard definition model and a high definition model and non-DVR and DVR. So just out of the gate, there would be four models. Would there be other -- like, would there be more than one single-tuner high definition box, I don't know.

Q. But you would at least have DVR versus non-DVR variance and standard def versus high def variance?

A. In the 2003-2004 era, yes.

Q. Now, when you left Scientific-Atlanta, you were working on this

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RNG set-top box, correct?

A. Correct.

Q. And prior to that, the 1840 set-top box?

A. Correct.

Q. And I think in your declaration, you said that the 8300 was still being sold when you left Scientific-Atlanta; is that correct?

A. That's my understanding, yes.

Q. And the 1840 was also being sold?

A. I think so. I don't know.

Q. Now, you left Scientific-Atlanta in 2007, correct?

A. That is correct.

Q. What did you do then?

A. I went to work for the University of South Alabama, which is where I work now.

Q. And what have you been working on at the University of South Alabama?

A. I've conducted research on home networking and DVR performance. I've also conducted research -- now we're doing research in the world of satellite design and we

1
2 successfully launched a satellite in 2022.

3 Q. And have you worked on any set-top
4 box -- excuse me.

5 Have you worked on any set-top
6 boxes since you left Scientific-Atlanta?

7 A. No. And to be clear, I did work on
8 DVR performance but not on set-top boxes
9 directly.

10 Q. Now, you know what an MPEG-2
11 transport stream is, correct?

12 A. Yes.

13 Q. What is it?

14 MR. FULLER: Objection to
15 form.

16 A. Generally speaking, an MPEG-2
17 transport stream is used to convey audio and
18 video information. MPEG means it is in a
19 compressed digital format. Transport stream
20 means that it's possible that multiple -- how
21 do I describe this -- multiple -- by way of
22 example, like HBO and the Golf Channel can be
23 on the same transport stream.

24 So the transport stream lets you
25 send multiple audio and video streams over a

1
2 single communications channel.

3 Q. And I think I heard you say an
4 MPEG-2 transport stream is digital data?

5 A. The stream itself is digital, yes.

6 Q. Now, for a set-top box to receive
7 an MPEG-2 transport stream and output it for
8 viewing, the set-top box has to include an
9 analog-to-digital converter; is that correct?

10 MR. FULLER: Objection to
11 form.

12 A. I mean, I think it's fair to say
13 that there is analog-to-digital conversion in
14 there somewhere. Let me think about that.

15 There would have to be
16 analog-to-digital conversion in there
17 somewhere.

18 Q. And for the set-top box to output
19 the MPEG-2 transport stream, the set-top box
20 would also have to include a demodulator; is
21 that correct?

22 MR. FULLER: Objection to
23 form.

24 A. Yes. There would have to be a
25 demodulation step in there somewhere.

1

2 Q. And for the set-top box output, the
3 MPEG-2 transport stream for viewing, there
4 would have to be an MPEG decoder in the set-top
5 box?

6 A. Yes. There would have to be a
7 decoder.

8 Q. Now, is an MPEG-2 transport stream
9 considered an in-band channel?

10 A. Yes. The MPEG-2 transport stream
11 would be carried in-band, yes.

12 Q. And that's because they carry the
13 video for TV channels or video on demand?

14 A. Yes.

15 Q. What kind of information does an
16 out-of-band channel carry?

17 A. The out-of-band channel is used to
18 convey control information. For example, if a
19 subscriber subscribes to HBO, the out-of-band
20 is used to tell a specific set-top that that
21 subscriber has subscribed to HBO and that box
22 is now authorized to view HBO. That's an
23 example of something that would go over the
24 out-of-band.

25 Q. And did that control information in

1
2 the out-of-band channel, is that also digital
3 data?

4 A. At some layer, you know, after it's
5 been demodulated, yes.

6 Q. So there's no way for the set-top
7 box to receive the control information on the
8 out-of-band channel unless it has an
9 analog-to-digital converter?

10 MR. FULLER: Objection to
11 form.

12 A. There would have to be
13 analog-to-digital conversion somewhere. Now,
14 the signal over the cable is analog, and it's
15 analog for a long time, even in the set-top
16 box, but at some point it would be converted to
17 digital.

18 Q. In order to get out the control
19 information at some point, the signal has got
20 to be converted to digital?

21 A. Yes.

22 Q. And that would involve an
23 analog-to-digital converter and a demodulator?

24 MR. FULLER: Objection to
25 form.

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A. It would involve at least a demodulator.

Q. And would the out-of-band control information also require a decoder?

A. I'm sorry. To be clear, what do you mean by "decoder"?

Q. Well, we talked about an MPEG decoder, which correct me if I'm wrong, my understanding is that converts the digital MPEG data into something that can be output to, like, a television?

A. Right.

Q. Would the out-of-band data after it comes out of the demodulator need to go through a decoder for the set-top box to understand it?

MR. FULLER: Objection to form.

A. I guess the short answer is no, because I don't -- I don't know what decoder we mean in that context. So I guess the short answer is no.

Q. Now, what do you understand decoder to mean?

MR. FULLER: Objection to

1
2 form.

3 A. Decoder is a very broad term in the
4 art. Now, MPEG decoder, for example, is a very
5 specific thing. That's why I asked you about
6 decoder, what did you mean by it, because it's
7 a very broad term in the art.

8 Q. Okay. In your declaration, you
9 talk about two SCTE specifications for
10 out-of-band channels?

11 A. I'm sorry. By "SCTE," do you mean
12 SCTE?

13 Q. Yes. Sorry. S-C-T-E.

14 A. Okay. You got me on that one.

15 Q. I've heard it referred to as SCTE.

16 A. I've never heard that before, but
17 I'll accept that.

18 Yes, I refer to two SCTE
19 specifications. Yes.

20 Q. So would they -- like, similar to
21 MPEG, would they have a decoder that goes with
22 that SCTE specification?

23 A. I don't think so. At some layer,
24 it's network packets. I think it's ATM cells
25 actually, or something really strange. But I

1
2 think it's -- you know, it's network packets.

3 So it's not -- so I'm not aware of
4 something that I would necessarily call a
5 decoder in the middle of that, that I recall at
6 the moment.

7 Q. Okay. Now, in your '008
8 declaration, you describe how sending a
9 technician to a subscriber premises to monitor
10 the spectrum received by the subscriber set-top
11 box was costly and impractical, correct?

12 A. It was certainly costly, yes.

13 Q. And what would happen when the
14 technician got to the subscriber's premises or
15 home?

16 A. Well, it depends on, you know, the
17 person -- excuse me. The cable company
18 employee may have to get access to the
19 premises. The equipment he may be looking for
20 may be locked behind a gate or locked up in
21 some supply closet. The person may have to be
22 let into the person's home. The person at the
23 home may have to put the dog up. The person at
24 home maybe had been waiting for four hours. So
25 there were a lot of issues surrounding that.

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Q. Assuming the technician could get access to the equipment they needed to access, what would the technician do then?

MR. FULLER: Objection to the form. Objection to scope.

A. Well, I don't know all the details of the standard way of doing it. But I think a person of ordinary skill would assume that they would start by measuring the signal coming out of the cable to see is the problem with the cable network or the person's home.

And then if that signal was good, go into the person's home. If the signal was bad, go back out and fix the network.

But I think that's what a person of ordinary skill would assume.

Q. And so what kind of measurements would the technician take of the signal?

A. They might use something like a spectrum analyzer or some similar piece of equipment. Again, I'm not sure. I've never worked with cable technicians. I don't know exactly what they would do, but it would be something like that.

1

2 Q. And if a subscriber has multiple
3 set-top boxes, could the set-top boxes
4 experience different signal quality within the
5 subscriber's home?

6 MR. FULLER: Objection to the
7 scope.

8 A. I mean, it's certainly physically
9 possible, depending on the home wiring.

10 Q. Because they're in -- coaxial cable
11 running through the house to different rooms?

12 A. Yes.

13 Q. So each set-top box could be
14 getting different signal problems?

15 A. Potentially.

16 Q. Do you know if -- would the --
17 these measurements that the technicians were
18 taking, would they check both in-band- and
19 out-of-band channels?

20 MR. FULLER: Objection to
21 form. Objection to scope.

22 A. Well, if you were just using a
23 spectrum analyzer, you would probably sweep
24 through all the frequencies. I guess it's
25 possible. I don't know what the playbook would

1
2 be but I assume it would be something like
3 that.

4 Q. So in the case that the
5 subscriber's issue dealt with, for example,
6 receiving premium channels like HBO, would the
7 technician then need to check the out-of-band
8 channel specifically?

9 A. Maybe. I don't know.

10 Q. And if a technician wanted to check
11 the out-of-band channel, would they have to
12 perform some sort of digital spectrum analysis
13 on the signal?

14 MR. FULLER: Objection to the
15 form. Objection to scope.

16 A. With all due respect, that's
17 self-contradictory. You're either analyzing
18 the spectrum or you're doing something digital.
19 The spectrum is an analog construct, which is a
20 longwinded way of saying I don't understand
21 your question. Sorry.

22 Q. Give me just a second. So if a
23 technician wanted to check the out-of-band
24 channel, they would have to perform some sort
25 of digital analysis on the receive signal?

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MR. FULLER: Objection to the
form.

A. I mean, they might, or they might
just check the signal level, which is an analog
property.

Q. From the perspective of the cable
network provider, they would want to avoid as
many on-site visits as possible?

A. Absolutely.

Q. And so in your declaration, you say
that the less expensive option than an on-site
visit would be to remotely monitor the signal
received at the set-top box?

A. Yes.

Q. So since set-top boxes could
receive different signals, depending on the
quality of the wiring within the subscriber's
home, from the perspective of the cable network
provider, would it be better to have remote
monitoring in every set-top box?

A. The way I would put it is even one
monitor in the home is better than none,
because it's going to tell you, at least,
something about the entire network. And at

1
2 that point, it just depends on how expensive it
3 is to add the feature.

4 If remote spectrum monitoring costs
5 money, the cable operator is going to have to
6 trade off how much extra money they spend
7 versus truck rolls or whatever. Again, that's
8 what a person of ordinary skill would
9 understand.

10 Q. And if a subscriber is having a
11 problem that required an on-site technician,
12 the technician gets sent regardless of how many
13 or what type of set-top boxes the user has?

14 MR. FULLER: Objection to
15 form.

16 A. I'm not sure how to answer except
17 to say that, yes, if even one set-top box is
18 acting up, there would have to be a truck roll.

19 Q. And that wouldn't depend on what
20 type of box it is, what type of set-top box,
21 correct?

22 A. Yes, I think that would be
23 generally true.

24 MR. QUALEY: Can we go off
25 the record for a minute.

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(Recess from 8:43 a.m. to
8:54 a.m.)

BY MR. QUALEY:

Q. Now, Dr. Russ, when you were
working as a set-top box design manager, when
you're developing new set-top box models, do
you test the models as part of the development
process?

A. Yes.

Q. And what kind of testing do you do?

A. At Scientific-Atlanta, we called it
design qualification testing. And so we test
to the specifications that the customer gave us
and whatever other specifications, you know, we
accumulated over time.

Q. And so would you test that the
set-top box was receiving the signals
correctly?

A. Yes.

Q. And how did you test that?

A. We wrote diagnostic software to,
you know, kind of turn everything on. And then
a variety of ways to do it. Like in the analog
domain, we would look at things like signal

1
2 strength. After being demodulated and turned
3 into a digital bitstream, we might look at the
4 digital bitstream.

5 Q. How would you look at the signal
6 strength?

7 A. The signal strength comes from the
8 automatic gain control loop. And so the
9 process of performing automatic -- short
10 story -- the process of performing automatic
11 gain control enables you to infer what the
12 strength of the signal has to be.

13 Q. And was that -- you said you wrote
14 diagnostic software. Was that software that
15 was running inside the set-top box?

16 A. To be clear, my co-workers wrote
17 the diagnostic software. But, yes, that was
18 software running inside the set-top box.

19 And then we would also -- I mean,
20 it might be some sort of meter or something
21 involved. But the diagnostic software ran in
22 the set-top box.

23 Q. And you said the diagnostic
24 software -- I can't remember if it's the exact
25 word -- but analyzed the digital bitstream?

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MR. FULLER: Objection to
form.

A. I think the way I would put it is
the diagnostic software watched -- the set-top
is highly optimized to get an MPEG transport
stream and display it. And so it would start
doing that, and then the diagnostic software
would monitor what was going on while it was
doing that.

Q. So is it monitoring for things like
error rate?

A. It could, yes.

Q. I guess what other kind of things
would it monitor for?

A. Let me think about that. It might
monitor like a packet error rate or
uncorrectable errors.

Q. But --

A. It would monitor some sort of error
rate.

Q. So those were error rates on the
digital part -- strike that.

Error rates in the digital signal?

A. That might be one thing, or it

1
2 could just be as simple as the automatic gain
3 control lost lock. It can count the number of
4 times it lost lock, for example. That would be
5 an error condition. So it's just looking for
6 abnormalities in the signal chain.

7 Q. What does "lost lock" mean?

8 A. The tuner is trying to pull out a
9 single 6-megahertz channel. And for it to
10 work, it has to be -- it has to, like, hit that
11 frequency exactly. And there's ways to tell in
12 the analog domain if you're not tuned to the
13 right frequency or if the signal is
14 intermittent for some reason, it will lose
15 lock.

16 Q. So that's in the situation where
17 you have a single-channel analog tuner? Am I
18 understanding that correctly?

19 MR. FULLER: Objection to
20 form.

21 A. Well, that would be one place where
22 it would show up. This would apply to tuners
23 in general.

24 Q. So when you were at
25 Scientific-Atlanta, though, you could program

1
2 the set-top box to analyze the digital signal;
3 is that correct?

4 MR. FULLER: Objection to
5 form.

6 A. Yes. And, of course, keep in mind,
7 in diagnostic mode, you're not really
8 necessarily watching television. But, yes, you
9 could program the set-top box to analyze the
10 signal in diagnostic mode.

11 Q. You can analyze both analog or
12 digital?

13 A. You could analyze elements of the
14 entire signal chain, yes.

15 Q. And is diagnostic mode, would that
16 also be available to the technician if he made
17 an on-site visit to look at some of these
18 set-top box?

19 MR. FULLER: Objection to
20 form. Objection to scope.

21 A. I'm not sure what diagnostics were
22 available in production mode. The diagnostic
23 mode is designed to give you an x-ray of the
24 set-top box. Right? I'm not sure how it would
25 work in the field.

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Q. I guess when your group was finished with the development of a set-top box, was there a diagnostic mode available in the software as it went to production?

MR. FULLER: Objection to form. Objection to scope.

A. Well, first off, to be clear, a set-top box still in diagnostic mode at the customer's site was considered a major mistake by the factory. As far as, you know, all traces of diagnostic software were removed from the set-top to enable the installation of the production set-top box software.

And, in fact, the set-top box was put into that production mode in the factory. So I don't know what diagnostic capabilities the production software had.

And let me back up. When I say "production software," I mean the software that enables one to watch television in their home. I don't know what diagnostic capabilities the production software had.

Q. I guess, who wrote the production software?

1

2 A. A completely different software
3 group.

4 Q. So your group was -- am I right,
5 was more in getting the hardware of the box put
6 together?

7 A. Yes. And so the purpose of
8 diagnostic software was to put just enough
9 software on the box to test the hardware,
10 mainly for manufacturing.

11 Q. When you say "mainly for
12 manufacturing," can you explain that?

13 A. Sure. The diagnostic software was
14 running on the set-top so that the factory can
15 make sure the set-top was properly assembled,
16 you know, that resistor over there had the
17 right value or that capacitor over there is
18 missing. That's the kind of thing
19 diagnostic -- that's what a factory screens for
20 in production, and the diagnostic software was
21 really designed to support that.

22 Q. So every set-top box that came off
23 the manufacturing line, at some point would
24 have the diagnostic software on it, and then at
25 least assuming things went correctly, that

1
2 would be replaced by the production software
3 when it was sent to the subscriber?

4 A. That is correct.

5 Q. And your group did the diagnostic
6 software but not the production software?

7 A. Correct.

8 Q. And do you know if the production
9 software contained any diagnostic capabilities?

10 MR. FULLER: Objection to
11 form. Objection to scope.

12 A. I don't know.

13 Q. When you were testing the box --
14 strike that.

15 When your group put diagnostic
16 software on the set-top box and you said you
17 would analyze the signal coming in, what were
18 you using for the source of the signal?

19 A. Pieces of test equipment. And
20 because we were using test equipment, I guess
21 it's fair to say we were confident the signal
22 was good, because you're sitting in a lab
23 setting or a factory setting. So, really, it
24 was there to measure whether or not the set-top
25 box was processing the signal correctly. So we

1
2 would use test equipment to make sure we kind
3 of were starting with a known good signal.

4 Q. You were only sending it from one
5 side of the lab to the other?

6 A. Yes.

7 Q. Now, one of the boxes you worked on
8 was the Explorer 4200 set-top box; is that
9 correct?

10 A. That is correct.

11 Q. And that was released in 2002?

12 A. That's my recollection, yes.

13 MR. QUALEY: I'll ask the
14 court reporter to mark this as
15 Exhibit 1031.

16 (Exhibit 1031 was marked for
17 identification.)

18 BY MR. QUALEY:

19 Q. And, Dr. Russ, Exhibit 1031 that
20 you've just been handed, is, from what I can
21 tell, a press release of some kind from
22 Scientific-Atlanta about the Explorer 4200,
23 dated August 7, 2002.

24 A. Yes, this is an article from 2000
25 discussing the Explorer 4200. Yes.

1

2 Q. So it's -- just to try and help
3 you, hopefully this is consistent with your
4 recollection.

5 A. This is -- yes. And importantly,
6 this is -- there's a lot in here that the 4200
7 never actually did in somebody's home. But
8 this is what the 4200 was designed to be
9 capable of.

10 Q. Now, when you say "didn't do it in
11 somebody's home," I guess, what do you mean by
12 that?

13 A. A 4200 was never connected to
14 something wireless in somebody's home, for
15 example. The 4200 that we shipped to
16 Cablevision did not provide home gateway
17 functionality.

18 Let me back up.

19 This article mentions home gateway.
20 Some people, when they say "home gateway," they
21 mean deliver internet access. The 4200 did not
22 deliver internet access to any other device in
23 the home. We actually took the ethernet port
24 out of the product to save money because it was
25 not needed. And so the 4200 was capable of

1
2 being a home gateway. We were in the middle of
3 designing things to attach to it. But as far
4 as I know, they were never sold.

5 Q. Now, I think you said that it
6 delivered internet access -- it didn't deliver
7 it to any other device, but the 4200 did itself
8 connect to the internet? Am I understanding
9 that correctly?

10 A. Yes. And, in fact, I think --
11 well, let me take that back. I have to think
12 about that.

13 I know that we had a product that
14 ran on even the non-DOCSIS set-tops called --
15 where they can surf the web on the TV set. It
16 was pretty pathetic, but they could do it. And
17 I think -- I know the 4200 could do that,
18 because I know even the non-DOCSIS set-tops
19 could do it.

20 So I don't know if the 4200 could
21 browse the internet generally. Again, I don't
22 know what the production software was actually
23 capable of.

24 Q. But the 4200 included a DOCSIS
25 tuner?

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A. Yes.

Q. At least that part of the press release is correct?

A. Absolutely. Yes.

Q. And did the 4200 use the DOCSIS tuner to receive out-of-band signals?

A. I think the way I would put it is that it could. I don't know how the Cablevision system actually worked. The DOCSIS was available. But, also, I know you could use the DOCSIS forward path for -- you could theoretically use the DOCSIS forward path for in-band functions as well, like program guide data. So I don't know how the Cablevision system worked.

Q. So am I right in thinking it would be capable of receiving the out-of-band on the DOCSIS tuner, but you don't know if it actually worked that way in production. Is that accurate?

A. That is accurate.

Q. And would the DOCSIS modem in the 4200 also send upstream out-of-band signals?

MR. FULLER: Objection to

1
2 form. Objection to scope.

3 A. I have to break that down a little
4 bit. In cable boxes, there was a diplexer.
5 Everything below 42 megahertz was upstream,
6 everything above 54 megahertz is downstream.
7 So everything 42 megahertz and below is out of
8 band in the sense that it's not at the same
9 frequency. That's how all cable products
10 worked, cable modems and cable set-top boxes.

11 So if by "out of band" you mean the
12 band reserved for transmitting, yes.

13 Q. So the DOCSIS modem in the 4200 was
14 capable of sending data back upstream to the
15 headend?

16 A. The way I would say it is an
17 ordinary single-tuner set-top box and a
18 DOCSIS-enabled set-top box had a transmitter
19 capable of sending data back to the headend.

20 Q. And would the 4200 use its DOCSIS
21 modem to send data back to the headend?

22 MR. FULLER: Objection to
23 form.

24 A. I'm sorry. The terminology here.
25 When I think of the DOCSIS modem, I'm thinking

1
2 of the downstream path. But certainly both
3 DOCSIS and a conventional set-top would have an
4 upstream path that would be necessary for the
5 system to work.

6 Q. Now, in your '008 declaration, you
7 talk about the DOCSIS using 6-megahertz
8 channels; is that right?

9 A. Yes, the downstream path in DOCSIS
10 is 6 megahertz in the U.S. Yes.

11 Q. When was DOCSIS developed?

12 A. It was developed by the time I got
13 there, so I think around '99 or 2000, but it
14 may be older than that. I don't recall.

15 Q. And it was using 6-megahertz
16 channels when you got to Scientific-Atlanta?

17 A. The downstream path has always
18 used 6 megahertz as far as I know, at least as
19 of the time I got there.

20 Q. And television channels also use 6
21 megahertz bandwidth?

22 A. Yes. That's where the 6 megahertz
23 came from. NTSC-formatted television
24 uses 6-megahertz channels.

25 Q. And that was just adopted over into

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DOCSIS?

A. Right. It dates back to, like, the 1930s.

Q. And did DOCSIS also use QAM, quadrature amplitude modulation?

A. Yes. When we say "QAM," it's spelled Q-A-M.

Q. And did digital television channels also use QAM?

A. Yes.

Q. So in DOCSIS, there is some interaction between the headend and the cable -- the DOCSIS cable modem in the set-top box; is that correct?

MR. FULLER: Objection to form.

A. In the case of both DOCSIS and non-DOCSIS set-top boxes, that is true. Yes.

Q. And the DOCSIS cable modem in the set-top box connects to a CMTS, or cable modem termination system? Am I getting that acronym right?

A. Yes, that's correct.

Q. And does the DOCSIS modem report a

1
2 profile of its capabilities to the CMTS?

3 MR. FULLER: Objection to
4 form.

5 A. I don't know. I'm not that
6 familiar with the DOCSIS standard.

7 Q. Do you know if the DOCSIS modem had
8 to report any information about the signal
9 strength it was receiving to the CMTS?

10 A. I think the DOCSIS tuner, yes, had
11 to -- the DOCSIS modem had to make a signal
12 strength measurement.

13 Let me word it this way: The
14 DOCSIS modem had to make a signal strength
15 measurement that was required by the standard.

16 Q. And was that signal strength
17 measurement reported to the CMTS at the
18 headend?

19 MR. FULLER: Objection to
20 form. Objection to scope.

21 A. I'm not sure how it was used.

22 Q. But there at least was some
23 coordination between the DOCSIS cable modem and
24 the set-top box and the CMTS regarding the
25 signals that they're exchanging, correct?

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MR. FULLER: Objection to
form.

A. Yes. For example, a set-top box
has to receive permission before it can
transmit one way or another. The protocol
requires it to receive before it can transmit.
So there's always interaction between the
set-top and the headend.

Q. But you don't know the specifics
just because you're not an expert in the DOCSIS
standard?

MR. FULLER: Objection to
form. Objection to scope.

A. I don't know the specifics of how
the signal strength information was used, but I
am generally familiar with the negotiation that
occurred for it to transmit.

Q. Was there a negotiation just when
the set-top box joins the network?

A. I think the process was actually
kind of complicated. And I don't know all of
it. But the set-top box would certainly have
to receive authorization and also the set-top
box would have to -- down at the physical

1
2 layer, it has to have -- there's protocols to
3 guarantee that only one set-top box at a time
4 is transmitting.

5 Q. Was a certain level of signal
6 strength required for the DOCSIS modem and the
7 set-top box to be able to communicate with the
8 CMTS?

9 MR. FULLER: Objection to
10 form. Objection to scope.

11 A. Well, I mean, everything has to
12 have a certain signal strength for it to work.
13 Like cell phones, we're familiar with the bars
14 getting too low and you can't make a call.
15 It's the same kind of thing. Everything
16 requires a certain signal strength to work.

17 Q. Was the signal strength required
18 for DOCSIS different than for just receiving
19 television channels?

20 MR. FULLER: Objection to
21 form.

22 A. I don't know. I don't think so,
23 but I don't know.

24 Q. Now, you also worked on the
25 Explorer 8300, correct?

1

2 A. Correct.

3 Q. And that set-top box also had a
4 DOCSIS modem, correct?

5 A. The way I would put it, yeah, there
6 was a DOCSIS option for the set-top box. For
7 the cable operators that used DOCSIS, we could
8 build it out for DOCSIS. Yes.

9 Q. So were there variants of the 8300
10 set-top box?

11 A. Well, there were a lot of variants.
12 I mean, there was like an HD model and non-HD
13 model. I think we would do a different build
14 for DOCSIS operators than for non-DOCSIS
15 operators.

16 And, again, once we released to
17 mass production, we -- well, actually, yeah.
18 That's my recollection.

19 Q. So I guess, does the DOCSIS build
20 have additional hardware in it?

21 A. Well, it has a DOCSIS tuner.

22 Q. So that's a piece of hardware. I
23 just want to clarify that.

24 A. Yes.

25 Q. Sorry. Maybe my question wasn't

1
2 the best. I was trying to figure out if the
3 difference between the builds was a software
4 difference or a hardware difference.

5 A. Well, ultimately, both. But
6 certainly there is a hardware difference. You
7 either do or do not need a DOCSIS tuner,
8 depending on the system -- the architecture of
9 the system where it's being installed. And our
10 biggest customers were non-DOCSIS.

11 Q. And when did the 8300 set-top box
12 come out?

13 A. I think it was 2003 or 2004.
14 Again, we would release to mass production, and
15 then they would actually go into production
16 sometime later. We weren't ever -- you know,
17 2003, 2004 time frame.

18 Q. So there was some sort of lag
19 between when you basically signed off on a
20 set-top box and when they actually went out the
21 door?

22 A. That's right.

23 Q. And do you have any idea what that
24 lag time is?

25 A. No. No, I don't.

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Q. And would the models of set-top box
you worked on, would they already have a
commitment from a customer to purchase them?

MR. FULLER: Objection to
form.

A. I don't know. I mean, I -- I don't
know.

Q. But you would get some sort of
cable network provider requirements?

A. Yes.

Q. And you designed to meet those
requirements?

A. Yes.

Q. If I can ask you to pull up, out of
your stack in front of you, the Renken patent.

Looking at Figure 3 of the Renken
patent.

A. Okay.

Q. So the RF input coming in from the
left-hand side, that's the signal from the
cable network provider, correct?

A. Yes.

Q. And it goes through
analog-to-digital converter 25?

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A. Correct.

Q. And so at that point, it's converted into digital data?

MR. FULLER: Objection to form.

A. It's converted into a stream of digital measurements of an analog signal.

Q. And then we have a series of parallel digital down converters 22 shown in the figure, correct?

A. Correct.

Q. And so the digital down converter, what does that do?

MR. FULLER: Objection to form.

A. Well, I see the -- it goes to a QAM demodulator.

Q. Feel free to look at the patent or your report, or whatever.

A. According to column 12, line 22, the digital -- I should say the DDC 22 is responsible for filtering out -- i.e., selecting -- a particular downstream channel such as a DOCSIS 6- or 8-megahertz-wide channel

1
2 from the digital IF output of the ADC 25.

3 Q. Okay. So each DDC puts out a
4 selected channel?

5 A. It puts out a particular downstream
6 channel, yes. In the North America, that would
7 be a 6 megahertz channel.

8 Q. And then Figure 3 shows multiple
9 DDCs implemented in parallel?

10 A. Yes.

11 Q. So those DDCs can each concurrently
12 output whatever channel they're programmed to
13 select; is that correct?

14 MR. FULLER: Objection to
15 form.

16 A. Each DDC is outputting its own 6
17 megahertz channel.

18 Q. And they're doing that at the same
19 time?

20 MR. FULLER: Objection to
21 form.

22 A. They appear to be doing that at the
23 same time, yes.

24 Q. For example, they would need to do
25 that at the same time in order to implement

1
2 something like a feature like
3 picture-in-picture?

4 MR. FULLER: Objection to
5 form.

6 A. That might be one way to think
7 about it, yes.

8 Q. And the DDCs pass their signal
9 along to the QAM demodulator, which I think you
10 already said?

11 A. Right.

12 Q. And then what does the QAM
13 demodulator do?

14 A. Well, a demodulator is something
15 that turns the analog-formatted signal into a
16 digital data stream. And so the output of the
17 QAM demodulator is a digital bitstream, which
18 in this case would be something like an MPEG
19 transport stream.

20 Let me back up.

21 If block 24 is an MPEG decoder,
22 then what's coming out of the demodulator is an
23 MPEG transport stream.

24 Q. What had to go into the QAM
25 demodulator was some other data that -- some

1
2 other signal that contained the MPEG to
3 transport stream data?

4 MR. FULLER: Objection to
5 form.

6 A. What comes into it is a
7 QAM-modulated signal. So the purpose of the
8 QAM demodulator is to remove the QAM
9 demodulation, convert the data back to its
10 original digital form.

11 Now, the input to the demodulator
12 could be analog or it could be digital. In
13 this specific case, it's digital.

14 Q. If what is carried on the signal
15 going into the QAM demodulator is an MPEG-2
16 television channel, what comes out of the QAM
17 demodulator is an MPEG-2 transport stream?

18 MR. FULLER: Objection to
19 form.

20 A. Yes.

21 Q. And if what is on the signal coming
22 into the QAM demodulator is DOCSIS data or a
23 DOCSIS channel, then what comes out of the QAM
24 demodulator is in a DOCSIS format; is that
25 correct?

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MR. FULLER: Objection.

Object to form.

A. Yes.

Q. And then what finally comes out on the right-hand side of the figure is -- well, I'm sorry. Let's step back.

And then in box 24, we have -- it's labeled an MPEG/DOCSIS decoder.

So what does that do?

MR. FULLER: Objection to form.

A. Well, an MPEG decoder converts the MPEG transport stream into audio and video, like, actual audio and video. And then the DOCSIS decoder, I'm not sure what that is -- it's going to produce whatever -- or the relevant network packets that are coming over that DOCSIS stream.

Q. And then those data packets are put out on line 27 on the right-hand side of the figure?

A. Yes.

Q. And then just looking again at the figure, we have a dashed box, 21?

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A. Yes.

Q. That encloses the DDC and the QAM demodulator and the MPEG DOCSIS decoder?

A. Yes.

Q. And based on the figure, it has multiple parallel of those boxes 21, correct?

MR. FULLER: Objection to form.

A. There are multiple dashed box 21s in the figure, yes.

Q. And you would understand that to mean that there's multiple of these processing streams, for lack of a better word?

MR. FULLER: Objection to form.

A. Yes. He calls it receiver 21, and every receiver 21 has this MPEG DOCSIS decoder in it.

And I apologize. What was your original question?

Q. Just that there's multiple of those receiver 21s inside of the downstream receiver circuit 20, correct?

A. There are multiple 21s -- boxes 21s

1
2 in there, yes.

3 Q. And so each box 21 can concurrently
4 be outputting a data stream, depending on which
5 channel is selected in the digital down
6 converter?

7 MR. FULLER: Objection to
8 form.

9 A. Each can output an independent
10 channel. Yes.

11 Q. And it can all happen at the same
12 time, correct?

13 MR. FULLER: Objection to
14 form.

15 A. Yes.

16 MR. QUALEY: Why don't we
17 take a break.

18 (Recess from 9:35 a.m. to
19 9:46 a.m.)

20 BY MR. QUALEY:

21 Q. Dr. Russ, returning to Renken.

22 A. Okay.

23 Q. Now, the QAM demodulator shown in
24 Figure 3, do you see -- the lower of the two
25 QAM demodulators shown in Figure 3, do you see

1
2 the arrow pointing towards the bottom of the
3 figure?

4 A. Yes.

5 Q. And there's a parenthesis-type
6 thing labeled 23?

7 A. A bracket labeled 23. Yes, I see
8 that.

9 Q. And the bracket says, Measurement
10 data.

11 Correct?

12 A. Correct.

13 Q. And do you believe that the QAM
14 demodulator shown there is capable of analyzing
15 the output stream that it receives from the DDC
16 in taking measurement data?

17 MR. FULLER: Objection to
18 form. Objection to scope, as well.

19 A. I guess I'm confused. The issue is
20 that there's two 23s in the figure: QAM
21 demodulator 23 and measurement data 23.

22 MR. FULLER: I think that's
23 an error in the figure. Why don't
24 you look at column 12, line 53.

25 A. It says, QAM demodulators 23 of the

1
2 currently idle receiver or receivers 21 can be
3 queried by the measurement control of 300 to
4 perform a number of measurements.

5 Q. So the QAM demodulators are capable
6 of performing measurements on the output stream
7 they're receiving from the DDC; is that
8 correct?

9 MR. FULLER: Objection to
10 form. Objection to scope.

11 A. Well, I would say they're capable
12 of performing measurements. I don't think of
13 these as measurements of the stream. I think
14 of them as measurements, you know, in general.
15 Measuring the properties -- they're measuring
16 the properties of the signal, they're not --
17 they're measuring properties of the signal.

18 Q. And that's the signal they're
19 receiving from the digital down converter,
20 correct?

21 A. Yes.

22 Q. And then turning over to column 13,
23 starting at line 6, is it correct that the MPEG
24 DOCSIS decoder 24 can also perform measurements
25 on the signal it's receiving from the QAM

1
2 demodulator?

3 MR. FULLER: Objection to
4 scope.

5 A. The passage says that it can
6 perform measurements.

7 Q. And those measurements include bit
8 error rate; is that correct?

9 A. Yes.

10 Q. So going back to column 12 -- I
11 apologize for not going in order as I could
12 have.

13 Does Renken say that the QAM
14 demodulator -- one of the measurements it can
15 perform is MER, or modulation error ratio?

16 A. Yes, that's at -- yes, it mentions
17 a modulation error ratio.

18 Q. As a measurement that it can
19 perform?

20 A. Yes.

21 Q. If you can turn over to
22 Kamieniecki. Now, in paragraph E-5 of your
23 '008 declaration --

24 A. I'm there.

25 Q. Towards the bottom of the

1
2 paragraph, you say that the -- you see this --
3 the stated goal of Kamieniecki, which is to
4 avoid disturbing any user -- excuse me -- any
5 viewer experiences.

6 Do you see that?

7 A. I do.

8 Q. Is that the goal of Kamieniecki?

9 MR. FULLER: Objection to
10 form.

11 A. Well, I -- I think it would clearly
12 be a goal. I think a person of ordinary skill
13 would grasp that that would be a goal of every
14 single set-top box. I mean, I remember when we
15 tried to implement a screensaver to save -- so
16 the hard drive doesn't have to work as hard,
17 and we received complaints because people
18 wanted to keep their set-top tuned to the music
19 channel all day so their dog would be happy.
20 So people are very picky about the user
21 experience.

22 And I think a person of ordinary
23 skill would grasp that -- first off,
24 Kamieniecki says it expressly. And I would
25 argue that -- excuse me. A person of ordinary

1
2 skill would readily grasp that the primary
3 function of a set-top box is to watch
4 television. And nothing -- if anything we did
5 interfered with that, a person of ordinary
6 skill would get in trouble very quickly.

7 Q. But the title of Kamieniecki is
8 monitoring signal quality on a cable network,
9 correct?

10 A. Yes.

11 Q. So is it more accurate to say that
12 the goal would be monitoring signal quality on
13 a cable network without disturbing the user
14 experience?

15 MR. FULLER: Objection to
16 form.

17 A. I mean, that might be one way to
18 word it. But the way I would word it, a POSITA
19 would know this is a world where the set-top
20 box absolutely must not disrupt the viewer
21 experience. And so that set-top, given that
22 sort of iron law of set-top boxes, would then
23 be able to monitor signal quality.

24 Q. So the ideal situation from
25 Kamieniecki's perspective would be to monitor

1
2 the signal quality without disturbing the user?

3 A. I'm not sure that I would say
4 "ideal." I would say that would necessarily be
5 the case. A person of ordinary skill would
6 understand that that would be an essential
7 property.

8 Q. But from Kamieniecki's perspective,
9 he would prefer to do both, monitor and not
10 disturb?

11 MR. FULLER: Objection to
12 form.

13 A. Well, I mean, Kamieniecki expressly
14 discloses both. And understand that this
15 business of waiting for idle, I think a person
16 of ordinary skill would grasp, is essential.

17 Q. But Kamieniecki also wants to
18 monitor?

19 A. Right. Kamieniecki wants a set-top
20 box to monitor any world where a set-top box
21 must not interfere with the viewer experience.
22 Yes, it adds the capability of monitoring to a
23 set-top that does not interfere with the viewer
24 experience.

25 Q. Right. He wants to do both,

1
2 monitor and not interfere with the viewer
3 experience?

4 A. Right. Given that the set-top
5 cannot interfere with the viewer experience, he
6 wants to add the capability to monitoring to
7 that system.

8 Q. Now, in your declaration -- strike
9 that.

10 Looking at your '008 declaration,
11 in paragraph 11, you talk about how the
12 Explorer 8300 was still being sold when you
13 left Scientific-Atlanta in 2007.

14 A. Yes.

15 Q. Was the 1840 set-top box also being
16 sold when you left?

17 MR. FULLER: Objection,
18 scope.

19 A. I don't know.

20 Q. So you worked -- if I remember
21 correctly, you worked on that one after the
22 8300?

23 A. That's my recollection, yes.

24 Q. And do you recall approximately how
25 long before you left Scientific-Atlanta you

1
2 finished the work on the 1840?

3 A. I'll have to admit it's a blur. I
4 don't remember.

5 Q. And do you know if the Explorer
6 4200 was still being sold when you left
7 Scientific-Atlanta?

8 A. That's a good one.

9 MR. FULLER: Objection to
10 scope.

11 A. I think so. I'm not sure.

12 Q. Going back to paragraph 11 of the
13 '008 declaration, you said that the 8300 was
14 being produced at a rate of 3 million a year
15 when you left the company in 2007?

16 A. Yes.

17 Q. Do you know how many Explorer 4200s
18 were produced in a year?

19 MR. FULLER: Objection to
20 scope.

21 A. Well, at the peak, which would have
22 been 2002, 2003, 2004, it was millions per
23 year. I don't know how many. I don't know how
24 many.

25 Q. And do you know how many 1840

1
2 set-top boxes were sold at their peak?

3 A. I have no idea. I don't know.

4 Q. Do you know if it was as popular as
5 the 4200 and 8300?

6 MR. FULLER: Objection to
7 scope.

8 A. I don't think it was as popular.

9 MR. QUALEY: Why don't we
10 take another break.

11 (Recess from 10:00 a.m. to
12 10:12 a.m.)

13 MR. QUALEY: Thank you for
14 your time today, Dr. Russ. I have
15 no further questions.

16 MR. FULLER: We'll go off the
17 record.

18 (Recess from 10:12 a.m. to
19 10:20 a.m.)

20 EXAMINATION

21 BY MR. FULLER:

22 Q. Earlier when counsel was discussing
23 Renken, he directed you to column 13, line 6,
24 and asked whether the QAM demodulator is taking
25 a measurement and you said "yes."

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Do you recall that?

A. I recall saying that, yes.

Q. Were you able to read that entire section of that column?

A. Not during the deposition itself, no.

Q. Could you take the time now to read it?

A. Okay. I've read it.

Q. After reading it, is your answer still yes to counsel's earlier question?

A. I believe my answer would be "no," because at the end of the paragraph, it makes clear that what's actually going on is some data is being passed from the demodulator to the controller 200 and the controller 200 is actually calculating the measurement parameters, such as bit error rates, data stream errors, or error rates. Those are actually being calculated by the controller 200.

MR. FULLER: No further questions.

MR. QUALEY: No further

1 questions from me.

2 MR. FULLER: We will read and
3 sign.

4 (The deposition of SAMUEL H.
5 RUSS, PH.D., concluded at
6 10:24 a.m. Central Standard
7 Time.)

8 * * * * * * *

1 REPORTER'S CERTIFICATE

2
3 I, Greta H. Duckett, Certified Court
4 Reporter, Registered Professional Reporter, and
5 Certified Realtime Reporter, hereby certify
6 that on Thursday, February 20, 2025, I reported
7 the deposition of SAMUEL H. RUSS, PH.D., who
8 was first duly sworn or affirmed to speak the
9 truth in the matter of the foregoing cause, and
10 that the pages herein contain a true and
11 accurate transcription of the examination of
12 said witness by counsel for the parties set out
13 herein.

14 I further certify that I am neither of
15 kin nor of counsel to any of the parties to
16 said cause, nor in any manner interested in the
17 results thereof.

18 This 24th day of February, 2025.
19
20

21
22 GRETA H. DUCKETT, RPR, CRR, CVR-S, RVR-M-S
23 Alabama CCR-12
24 Georgia CCR-2891
25 Hawaii CSR-540
Mississippi CCR-1945
Tennessee LCR-671
Washington CCR-23000643

CASE: Comcast Cable Communications, LLC
v. Entropic Communications, LLC

DATE: February 20, 2025 JOB NO.: 10235

WITNESS: Samuel H. Russ, Ph.D.

[illegible]

Subscribed and sworn to before me
this day of , 20 .

Notary Public

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