

UNITED STATES DISTRICT COURT
CENTRAL DISTRICT OF CALIFORNIA
HONORABLE DAVID O. CARTER, JUDGE PRESIDING

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ECHOSTAR SATELLITE CORP., et)	
al.,)	
)	
Plaintiffs,)	
)	
vs.)	No. SACV 03-950 DOC
)	Day 4, Volume III
NDS GROUP PLC, et al.,)	
)	
Defendants.)	
_____)	

REPORTER'S TRANSCRIPT OF PROCEEDINGS

Jury Trial

Santa Ana, California

Tuesday, April 15, 2008

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Federal Official Court Reporter
United States District Court
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I N D E X

WITNESSES	DIRECT	CROSS	REDIRECT	RECROSS
NICOLAS, Christophe				
By Mr. Stone		5		

EXHIBITS

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1 SANTA ANA, CALIFORNIA, TUESDAY, APRIL 15, 2008

2 Day 4, Volume III

3 (1:00 p.m.)

4 THE COURT: All right. The jury's present. All
5 counsel are present.

6 Counsel, thank you for your courtesy.

7 If you would please be seated.

8 The witness is present, along with the
9 interpreter.

10 Counsel, this is the continued cross-examination
11 by Mr. Stone of Mr. Nicolas.

12 MR. STONE: Thank you, Your Honor. I realize I
13 neglected to move in one exhibit from the morning session,
14 and that's Exhibit 1190.

15 THE COURT: We'll come back to that, Counsel, so
16 why don't you continue. Oh, I'm sorry. That's the picture
17 of the P4 card?

18 MR. STONE: Yes, sir.

19 THE COURT: It's received.

20 MR. STONE: Thank you, Your Honor.

21 (Exhibit No. 1190 received in evidence.)

22 CHRISTOPHE NICOLAS, PLAINTIFF'S WITNESS, PREVIOUSLY SWORN

23 RESUMED THE STAND
24
25

1 CROSS-EXAMINATION (Continued)

2 BY MR. STONE:

3 Q. Good afternoon, Mr. Nicolas.

4 A. Good afternoon.

5 Q. Did you have an opportunity to look at the ROM 10 code
6 over the lunch hour?

7 A. No, we didn't do that yet.

8 Q. Am I correct that at the time you started at
9 NagraVision, they had not created a memory map for the ROM 2
10 or ROM 3 card?11 A. If I recall correctly, I had to write that document
12 myself, yes, sir.13 Q. And can you tell the folks on the jury what a memory
14 map is?15 A. I think what we call memory map is a piece of document
16 or a file where every location of the memory may need the
17 RAM is defined. And we will say, okay, at that location,
18 then, we will have that type of variable at that location,
19 and another location will have another type of data.20 And that help, I think, the programmer to know where is
21 what in term of that "abometer" (sic) that you need to use
22 on your software.23 Q. And that's a standard document in the development of
24 Smart Card software; correct?

25 A. We can say that, yeah. That's a pretty standard

1 document to have.

2 Q. So you come out of school. They finish the ROM 2.

3 We're almost done with ROM 3, and there was no memory map in
4 existence for either ROM 2 or ROM 3; is that correct?

5 A. Yeah. There was no document that can be shared with me
6 easily to have access to that.

7 Q. And am I correct that NagraVision also didn't have any
8 programmer's guide or manual for the ROM 2 and ROM 3 card
9 when you started?

10 A. We had a few documents that helps to understand the
11 hardware. I don't know what you are talking about,
12 programming guide, but there was multiple file or
13 specification about the system itself. I don't know which
14 one you are referring to or which type of document you are
15 referring to.

16 Q. Maybe this would be easier if I showed you your
17 declaration, Exhibit 1283, filed with this Court.

18 A. Um-hm.

19 Q. First of all, looking at Exhibit 1283, if you could go
20 to the very last page and tell me if that's your signature.

21 A. Yes, it is.

22 Q. And you knew when you signed it that this was a
23 document that you were submitting to the Court, correct?

24 A. Correct, yes.

25 Q. And if you could go to page 5 -- or excuse me, page 3,

1 paragraph 5 of Exhibit 1283, your declaration.

2 I think these are your words at lines 5 through 6:

3 "Because there did not already exist a memory map nor any
4 documentation of the API, such as a programmer's guide or
5 manual, that identifies the purpose of each memory address
6 in the DNASP-II chips or explains the use of the bytes in
7 memory regions."

8 Those are your words, correct?

9 A. Yeah. Now I understand what you are meaning by
10 programmer's guide. That's correct, yes. There were none.

11 MR. STONE: Your Honor, I would move Exhibit 1283
12 at this point.

13 THE COURT: Well, not the entire document.

14 MR. STONE: Just that portion.

15 THE COURT: We'll excise the other portions.
16 They're superfluous.

17 MR. STONE: Yes.

18 THE COURT: And that portion will be received, but
19 I'll see the edited form this evening.

20 MR. STONE: Right. I just wanted to publish that
21 paragraph 5 on page 3.

22 THE COURT: You may.

23 MR. STONE: Thank you, Your Honor.

24 (Exhibit 1283 received in evidence.)

25 (Document displayed.)

1 BY MR. STONE:

2 Q. Now, what were you referring to when you said when you
3 began at NagraVision, there was no programmer's guide or
4 manual?

5 A. I think, if you read the full sentence, there is no
6 programmer's guide or manual that identifies the purpose of
7 each memory address in the DNASP chip. That's what I was
8 referring to. There was no memory map nor a document
9 mentioning that.

10 Q. Well, what is documentation of the API?

11 A. API, I think in our jargon, stands for application
12 programming interface.

13 Q. And is that usually a fairly detailed document?

14 A. Yeah. That might be a fairly detailed document, yes.

15 Q. Okay. And that didn't exist when you started at
16 NagraVision, correct?

17 A. There was one main document or reference that came in
18 that we were using which explain the -- each feature or each
19 comment that are implemented in the card or sent to the
20 card. You can call that an API or not. It was not an
21 external API. When I written that, I was mentioning about
22 an external API to the code. It was one internal API
23 document that exist.

24 Q. I'm sorry, sir. I think your words are at line 6, "nor
25 any documentation of the API."

1 Did I read that correctly?

2 A. Yeah. Correct, yeah.

3 Q. And no programmer's guide or manual, correct?

4 A. Yeah. That's correct, yeah.

5 Q. And no memory map?

6 A. Uh-huh.

7 Q. And didn't you say that those documents never existed?

8 A. That's correct.

9 Q. And you said you had to prepare a memory map when you
10 showed up straight out of school?

11 A. That's correct, yes.

12 Q. And this is after ROM 2 had already been completed,
13 right?

14 A. That's correct.

15 Q. And if you started in April, that was about four months
16 before the ROM 3 was completed in September of 1996?

17 A. I would say September, October, November time frame.

18 Q. Why don't we look at your memory map, which is
19 Exhibit 1403, please.

20 And before I ask you a question about that, is it true
21 that all this documentation that did not exist is standard
22 documentation used when developing secure Smart Card code?

23 A. Yeah. We can say that, yeah.

24 Q. Okay. You recognize Exhibit 1403, I take it?

25 A. Yes.

1 Q. Okay.

2 MR. STONE: I would move Exhibit 1403.

3 THE COURT: Any objection?

4 MR. HAGAN: No objection, Your Honor.

5 THE COURT: Received.

6 (Exhibit No. 1403 received in evidence.)

7 MR. STONE: If we could look at the first page.

8 (Document displayed.)

9 BY MR. STONE:

10 Q. And this is a handwritten document?

11 A. Definitely, yeah, handwriting, because it's mine.

12 Q. And you went through all the regions of memory and
13 hand-wrote the purposes of these regions and the purposes of
14 bytes that might be in these regions?

15 A. Yeah. That's correct, yes.

16 Q. And was there a reason you didn't create this on a
17 computer?

18 A. I think it was the way I was working, you know, when
19 we -- you are an engineer, you have an engineering book and
20 you write that. I think it was on paper there. And it was
21 useful to use the -- how do you call that?

22 THE INTERPRETER: The lines of the paper, the
23 squares.

24 THE WITNESS: Yeah, squared paper. You can use
25 the line for that kind of things.

1 BY MR. STONE:

2 Q. And how did you go about creating this document? What
3 did you look at?

4 A. So we mainly refer to the ROM code and identify all the
5 variable that are used in the computation.

6 Q. And how would other engineers access the memory map?

7 A. They were doing the same, I think, accessing reference
8 file which is in the ROM code, and that it is how it has
9 been published with the ROM code, and with their own type of
10 document as reference.

11 I like to work on paper and like to have that, that
12 way. So that's what I have produced for my work. But that
13 was my way to do it.

14 Q. Did that practice change when you took over development
15 of the ROM 10 card?

16 A. Yeah. Then we were using more advanced tool or
17 software that allow us to share more quickly amongst people
18 that kind of information or document.

19 Q. Was that done on a computer?

20 A. Yes.

21 Q. So when you were in charge of developing the ROM 10,
22 you changed the procedures for documentation of the code,
23 correct?

24 A. Yeah. Definitely we adapted the methodology to the
25 size of the team, which was growing extensively at that

1 time.

2 Q. And do you now maintain an official memory map?

3 A. So I think it's part of the development now to have
4 that minting with a given ROM code. But I'm not in charge
5 anymore of the software development since now 2004. So I
6 don't know if it's still the case today.

7 Q. Do you recall, why was the ROM 3 card developed?

8 A. My understanding is that it was just following the
9 ROM 2 card where there was no more memory left for the
10 software. And that's why they moved to the ROM 3, which was
11 a bit bigger in term of memory size, to fit all the feature
12 requested by the EchoStar system in the card.

13 MR. STONE: Your Honor, may I approach with a
14 demonstrative?

15 THE COURT: You may.

16 (Document displayed.)

17 MR. STONE: For the record, Your Honor, this is
18 A018, which is a demonstrative of the ST16 chip.

19 BY MR. STONE:

20 Q. If I understand it correctly, in ROM 2 there were
21 patches and bug fixes that were put into EEPROM because they
22 were not able to put it in the user ROM, which had already
23 been permanently put in the chip, correct?

24 A. So the system ROM is really the main part of the
25 software that we put into the Smart Card which is

1 quote/unquote burned into the chip as soon as you produce
2 the chip. And you cannot modify nor add anything in that
3 ROM.

4 The EEPROM is used to put feature or patch after the
5 production of the card.

6 Q. You said system ROM, sir. Did you misspeak?

7 A. Sorry?

8 Q. You said system ROM. Did you mean to say user ROM?

9 A. Yeah. In that chip the ROM memory location is splitted
10 into one part code, system ROM, one part that we call user
11 ROM, which is our part of the software. The ST ROM, or
12 system ROM, is the part of the software provided by our chip
13 set provider.

14 Q. And the system ROM is used by the manufacturer to test
15 the chip and things like that, correct?

16 A. Not only -- I think the system ROM give us the main
17 access to the other part of the hardware.

18 Q. So if I understand it, on ROM 2 there were certain
19 fixes, enhancements and bug patches that needed to be done.
20 So they were put in EEPROM instead of in the ROM; is that
21 correct?

22 A. Again, the system ROM -- the user ROM was already
23 produced, and you cannot modify that. So during the
24 development, we added the patches in the EEPROM.

25 The main purpose of the ROM 3 development was to make

1 sure that we can integrate those modification into a newly
2 developed user ROM and put that in the new Smart Card. And
3 then we produced the ROM 3 Smart Card and we deliver that.

4 Q. And do you recall that about 55 percent of the bytes in
5 the EEPROM were used for bug patches in ROM 2?

6 A. 55?

7 THE INTERPRETER: (Translates.)

8 BY MR. STONE:

9 Q. 2,274 correction bytes?

10 A. I don't recall the exact amount. I think it was a
11 large amount used for the patch, yes.

12 Q. And if it were 2,274 correction bytes in a 4-kilobyte
13 EEPROM, that's roughly 55 percent, correct?

14 A. Yeah. But the way the EEPROM is splitted is not -- the
15 EEPROM is not only used for the patch; it's used also to
16 store all the sensitive data and your entitlement rights.
17 And we can configure the EEPROM the way we want, one piece
18 for the patch, one piece for the ROM. So it means that as
19 soon as you have configured those two block, you cannot
20 change that.

21 So I cannot say that 55 percent were already used. It
22 really depends about that split.

23 Q. What is a correction byte?

24 A. Sorry?

25 Q. What is a correction byte in the EEPROM?

1 A. A correction byte in the EEPROM?

2 Q. Yes, sir.

3 A. I don't know what you mean there.

4 Q. Why don't we look at Exhibit 1406, which is the DNASP,
5 D-N-A-S-P, ROM code 3 release protocol.

6 THE COURT: Counsel, are you done with this
7 exhibit?

8 MR. STONE: Yes, Your Honor.

9 THE COURT: Please take it down.

10 BY MR. STONE:

11 Q. Do you recognize Exhibit 1406, the release protocol?

12 A. Yes, I do.

13 Q. And if you go to --

14 MR. STONE: Your Honor, at this point I would move
15 in 1406.

16 THE COURT: Any objection?

17 MR. HAGAN: No, objections, Your Honor.

18 THE COURT: Received.

19 (Exhibit No. 1406 received in evidence.)

20 MR. STONE: If I could publish, Your Honor.

21 THE COURT: You may.

22 (Document displayed.)

23 BY MR. STONE:

24 Q. If you go to page 1406-43 of the exhibit. And is that
25 the ROM 2 or so called DNASP-002 revision file?

1 A. That's correct, yes.

2 Q. And this would be the revision file for the EEPROM of
3 the ROM 2 card, correct?

4 A. Yes. That's correct, yeah.

5 Q. And do you recall the total number of bytes in the
6 EEPROM?

7 A. I don't recall in that ROM 3 card -- sorry, ROM 2, for
8 sure.

9 Q. If you go to page 1406-61, please. And about a third
10 of the page from the bottom, do you see where it says "end
11 file"?

12 Now, this is the end of the revision file for ROM 2.
13 You'll see it says "total number of correction bytes in
14 revision 2,274."

15 Do you have any understanding what the term "correction
16 bytes" --

17 A. Yeah. Now I understand. In the context I understand.
18 It's the number of data or of byte of patch that we have put
19 into that EEPROM at that time. About 2,000 byte.

20 Q. Now, are you familiar with the term "code review"?

21 A. Yes, I do.

22 Q. And a code review consists of tests and analysis of the
23 code to validate that the code is being implemented
24 properly, correct?

25 A. That's correct, yes.

1 Q. And a code review is also used to evaluate the quality
2 of the code, correct?

3 A. Yes, that's correct.

4 Q. And a code review is also used to detect bugs or errors
5 as they are found, correct?

6 A. That's correct.

7 Q. And isn't it true that in a professional code review,
8 the examination of the code is done by somebody other than
9 the authors of the code?

10 A. I think that's the perfect world, yes, to be able to do
11 that with an independent quote/unquote auditor of the code
12 is the best way to do it.

13 Q. And who is the independent auditor of the code for the
14 ROM 3 source code?

15 A. That was me, mostly me. When I joined the team, I
16 reviewed that on top of one or two other.

17 Q. And did anyone check your work?

18 A. At that time I was not really developing -- I was
19 developing test tools and doing that review and the test of
20 the card at EchoStar also that year.

21 Q. Was there an independent auditor who checked your
22 review of the code?

23 A. That was -- that was cross-examined by the other
24 developer of the group, yes.

25 Q. Pardon?

1 A. That was reviewed by Karl Osen. That was reviewed by
2 Marco Saselli, other people working on the project.

3 Q. Other developers of the code?

4 A. Correct.

5 Q. Was there anyone independent from the development of
6 the code who reviewed it for problems?

7 A. Again, I was the one not developing, reviewing the
8 code, and there were the developer reviewing my review.
9 It's a cross review.

10 Q. In a professional code review, the test procedures used
11 are typically documented, correct?

12 A. That's correct, yes.

13 Q. And the results are typically documented as well,
14 correct?

15 A. Correct.

16 Q. And didn't you testify on October 25th, 2007 that the
17 test protocols and test results for the ROM 3 code review
18 were documented?

19 A. The way we were doing that at that time is that as soon
20 as we are finished with one part of the review, we were
21 interacting directly with the developer, Marco and Karl; and
22 we were giving them the feedback, and they were fixing the
23 bugs or the issue directly in the code.

24 Q. So was it your testimony that the test protocols for
25 the code review and the results were documented?

1 A. Again, that document is part of the test protocol, and
2 that's the part which has been documented, documented and
3 produced. The other test -- code review that have been done
4 in Cheseaux were mainly directly integrated in the code and
5 fixed in the code.

6 Q. Well, why don't you look at Exhibit 1283, your
7 declaration, at paragraph 9, please. It should be in front
8 of you, I believe.

9 MR. STONE: Your Honor, may I publish this
10 paragraph?

11 THE COURT: You may.

12 (Document displayed.)

13 BY MR. STONE:

14 Q. Now, after your deposition I believe you went back to
15 search for the code review documents that you testified
16 existed, right?

17 A. That's correct, yes.

18 Q. And in your declaration didn't you say, "No such
19 documents were found. I believe my testimony was incorrect
20 when I said that such documents were created and that, in
21 fact, I believe that as I did the code review, I inserted
22 the code modifications directly on the original source code
23 before it was released"?

24 A. Yeah. I think that's what I have just tried to
25 explain. When the code review was done, the fix were done

1 directly on the source code.

2 Q. And is that standard for a code review?

3 A. It's standard when you have very small teams working
4 tightly together. You need to document all the code review
5 when you have a very large team both in term of development
6 and also in term of testing. And you need to be much more
7 formal in that case because people don't know each other.
8 There we were a small team and we were interacting directly
9 between us.

10 Q. But there is no record now of the code review tests or
11 the results that led to your insertions into the code; isn't
12 that correct?

13 A. I think, if I recall correctly, when I have done my
14 deposition, there was some misunderstanding because we have
15 that document, which is called "DNASP ROM 03 Release
16 Protocol," which I was calling that the test review. And
17 that have been produced.

18 And then when we did the testimony, we were asking for
19 other document, more the code review itself. And that was
20 the testing protocol and not the test review protocol. So
21 there was some misunderstanding there. So that document has
22 been produced, and I think it's the only one existing.

23 Q. You mean the code?

24 A. Sorry.

25 Q. You mean the code itself?

1 A. No, the document existing in term of code review.

2 Q. Well, I thought your declaration said no code review
3 documents existed.

4 A. That's the point. That's a release protocol and it's
5 not a code review document. And I misunderstood those two
6 documents during my deposition, and that's why we clarify
7 after, in that paper.

8 Q. So you would agree it's not standard to have no
9 documentation of the results of a code review?

10 A. It's not standard for big team; it might be standard
11 for smaller team. It's really a matter of -- everybody will
12 love to have more information documented in any cases, not
13 only in engineering, I think. And sometimes we are not
14 perfect. And, yes, we would have loved to have more formal
15 document, for sure.

16 Q. And this is for development of a Smart Card that was
17 supposed to be a Smart Card that was a secure Smart Card in
18 an application in a conditional access security system,
19 right?

20 A. That's correct, yes.

21 Q. Do you agree with plaintiff's expert, Dr. Rubin, that
22 buffer overflow attacks were one of the most common attacks
23 on computers in the late 1980s?

24 A. Yes, I agree.

25 Q. And did you learn about buffer overflow attacks at the

1 Swiss Federal Institute for Technology?

2 A. Yes.

3 Q. When you reviewed the code for the ROM 3 card, I take
4 it you noticed that Mr. Osen had deliberately chosen not to
5 check the length of messages for the communications buffer.

6 A. Yeah. So I don't know if I noticed that during the
7 review, but for sure we discussed that point with Mr. Osen.

8 Q. Do you agree that that created a vulnerability in the
9 card?

10 A. No, because at that time the ROM ghost effect was
11 unknown for us. And Karl show me or show confirmation from
12 ST that that was not -- he asked for confirmation about that
13 memory which was not existed. And at that time ST confirmed
14 to us that it was really no memory there. So no army could
15 write after that buffer. So no reason for me to do
16 anythings because it was a well-understood design choice
17 that has been made at that time.

18 Q. Well, the ROM 10 chip is not subject to memory
19 aliasing, is it?

20 A. As far as I know, no, it's not.

21 Q. And yet you still check the buffer to make sure it
22 doesn't overflow on the ROM 10; isn't that true?

23 A. Because in that case, if we overflow the buffer, as
24 there is some memory after that, you need to check that. I
25 think that's what I have tried to explain, maybe poorly,

1 this morning, and I hope you get that.

2 Q. Were any tests run to determine whether the chip used
3 in the ROM 3 card could be subject to memory aliasing?

4 A. What do you call about test run?

5 Q. Sending inputs to the card with increasing addresses to
6 see what results you get?

7 A. We have that kind of testing. I don't know exactly
8 which one we run or we don't run on that specific card. But
9 that normally part of the test run that we are doing, yes.

10 Q. So a normal part of a test run would be to give
11 increasing addresses to the card and see what data it
12 returns, right?

13 A. Yeah. Usually to run that test, you select a random
14 pattern of data that you send to the card, and then you
15 observe the behavior of the card. And the card will not do
16 anything except maybe resetting or starting again if a wrong
17 messages is received, which is the behavior that we want.
18 We don't want the card to extract that information.

19 And by using that type of testing, by no means we can
20 end up in random to the recipe that was published and have
21 access to that. So by no means we can find out that type of
22 attack using that type of testing.

23 Q. I didn't say random. I said did you have a test where
24 you put in increasing address locations into the card to see
25 what data came back?

1 A. I don't recall if we were increasing the number, but I
2 think we -- I'm saying sending messages bigger than what was
3 defined.

4 Q. Now, according to plaintiff's expert, there are two
5 other buffers in the ROM 3 code besides the communications
6 buffer. Do you agree with that?

7 A. I think there is multiple buffer in the card, so at
8 least two more for sure, yes.

9 Q. Is there a program buffer and an interrupt handling
10 routine buffer?

11 A. That sounds familiar, yes.

12 Q. And were those specifically checked to see if they
13 could be overflowed in the code?

14 A. The point is that -- what you need to understand is
15 that the communication buffer is the only one which will
16 store data coming from the outside of the card. So that's
17 the only one which is sensitive to buffer overflow attack.

18 The other buffer are used internally by our own
19 software to move data or to compute data. So by no means
20 will we write a code that will try to overflow our own code,
21 our own Smart Card, to disturb the computation. So by no
22 means you need that.

23 Q. My question was a little more simple.

24 Is it true that the code in the ROM 3 card specifically
25 checks whether the other two buffers can be overflowed or

1 not?

2 A. I don't think -- again, my answer is I don't think
3 there is any reasons to check that to a specific attack to
4 overflow that. So there may be a check, normal check to
5 check that the memory size is correct, but that's it.

6 Q. All right. So it makes a normal check to make sure the
7 message coming in is not in excess of those two buffers,
8 correct?

9 A. Again, in a normal memory space, you do that type of
10 check. In a very specific case, as we were in the
11 communication buffer, we don't need that check. I've tried
12 to explain that now for the third time, that there is no
13 member after that. You don't have to check that.

14 Q. And the two other buffers, you've just testified,
15 cannot be used for piracy attacks, correct?

16 A. Cannot be reached from the outside. So it cannot be
17 easily used for a piracy attack.

18 Q. And the one buffer that can be used was not checked for
19 the length of messages coming in, correct?

20 A. Because that buffer was just at the end of the memory,
21 and as there is nothing beyond that, there is no reason to
22 check, not to write after that.

23 Q. Did Mr. Osen give any reason for not checking that
24 buffer overflow other than --

25 A. Yes.

1 Q. -- the fact it was at the end of memory?

2 A. Yes. Definitely, yes.

3 Q. And was that to save time?

4 A. The reason was to be able to use a very fast
5 communication protocol between the receiver and the Smart
6 Card. And to do that we have very little times to receive
7 one byte, computer byte, store it in the buffer, and then
8 look for the next byte. So it's every piece of information
9 or every piece of software that we can spare there will give
10 us more times to have a faster communication.

11 Q. Now, the international protocol for Smart Cards is
12 ISO7816, correct?

13 A. I'm not so sure if it's international, but there is an
14 ISO protocol which defined a communication protocol from the
15 Smart Card that we were using in that case, yes.

16 Q. And does that protocol have something called an
17 intercharacter guard time?

18 A. It sounds like, yes.

19 Q. And is that intercharacter guard time adjustable?

20 A. Maybe. I'm not so familiar anymore with that protocol.
21 So it look familiar, so I trust you, yes.

22 Q. And the way that works is, is that you and I are
23 talking at this speed, but -- I -- could -- be -- talking --
24 at -- this -- speed, right?

25 THE COURT: Please don't.

1 MR. STONE: Speed it up a little bit.

2 BY MR. STONE:

3 Q. Or you could change it so it's more normal. That is
4 true of the ISO protocol?

5 A. That is true, yes.

6 Q. And isn't it true that NagraVision set it at the
7 minimum?

8 A. Yes, because that protocol -- the communication speed
9 has a direct impact, then, on the way you change channel on
10 your TV. And I don't think you want to change channel --
11 at -- this -- speed.

12 Q. Doesn't the card not process until the receive byte is
13 fully received?

14 A. The -- there is different mean. You can wait for the
15 full message, but also, as soon as the user wants to change
16 channel, when you receive the very first byte, we stop -- we
17 check if it's a channel change, and we stop the execution of
18 that -- starting that, because it takes -- it takes quite
19 some time to execute in the card some of the specific
20 messages. And we don't want to add half a second to the
21 channel change time. So that's why we want to be very quick
22 in exchanging the information and very quick in taking into
23 account the desire to move from one channel to the other.

24 Q. And how much execution time would it take for the two
25 lines of code to check the buffer and to execute?

1 A. So at that time it takes us a few clock cycle.

2 Q. Is it millionths of a second?

3 A. It's really a very short period of time, yes.

4 Q. Do you know who configured the memory access control
5 matrix for the ROM 3 card?

6 A. So I think I don't recall who would -- who was in
7 charge of that and who configured that on the ROM 3.

8 Q. And can the memory access control matrix be set so that
9 any code executing in the RAM, R-A-M, portion cannot be
10 executed in EEPROM?

11 A. If I recall correctly, on the ROM 3 the memory access
12 control is not avoiding any execution in RAM. I think it's
13 avoiding jump from one piece of the memory to another piece
14 of the memory. I think the non-RAM execution was added
15 later on in either ROM 10 or ROM 11. But I wasn't sure it
16 was the case like that.

17 Q. Let me show you Exhibit 538, please. The first page
18 has an e-mail from Mr. Guggenheim to you and some other
19 folks, dated April 23rd, 1999. Do you see that?

20 A. I see that, yes.

21 Q. And Mr. Guggenheim when he was at CIS Tech would
22 occasionally forward to you postings from websites, correct?

23 A. Yeah, I think both Alan and Suzanne Guggenheim were
24 sending us posting, yes.

25 MR. STONE: Okay. Your Honor, I would move 538 at

1 this point.

2 THE COURT: Any objection?

3 MR. HAGAN: No objections, Your Honor.

4 THE COURT: Received.

5 (Exhibit No. 538 received in evidence.)

6 MR. STONE: Okay. If we could show the first
7 page, the top, the date.

8 (Document displayed.)

9 MR. STONE: April 23rd, 1999.

10 And then if we could go to page 538-5.

11 (Document displayed.)

12 BY MR. STONE:

13 Q. There's a posting about the middle of the page from or
14 by Cooter senior member.

15 As part of Mr. Cooter's post, it says "A blast from the
16 past. Dump from running CAM Rev. 3.13."

17 Do you see that? It's beneath the line, Cooter.

18 That would be a revision number for the ROM 3, correct?

19 A. I'm not hundred percent sure, but...that's look like
20 the posting we were mentioning this morning about the Nipper
21 posting in October '98.

22 Q. Well, the only place I see Nipper is in the EEPROM
23 itself. If you look at address --

24 A. Yeah.

25 Q. -- e0-

1 A. I'm not saying it's that posting. I'm saying it looks
2 like.

3 Q. Okay. Well, looking at this posting, focusing your
4 attention on -- well, strike that.

5 This is a posting of a dump of EEPROM from a ROM 3
6 card, correct?

7 A. It looks like, yeah.

8 Q. Take your time if you want to look at it and confirm
9 it.

10 A. I cannot confirm a hundred percent that the 4,096 bytes
11 are correct.

12 Q. Okay.

13 A. But it looks like -- the pattern looks the same as an
14 EEPROM dump.

15 Q. Looking at the address of the EEPROM of E050 on the
16 left side. Now, that's hexadecimal code at that line,
17 correct?

18 A. Correct.

19 Q. And that translates into the ASCII phrase on the
20 right-hand side?

21 A. Yeah. Most probably, yeah.

22 Q. What is that phrase? Can you read that?

23 A. Yeah. That's the Nipper sentence that was put in the
24 card.

25 Q. Can you read what exactly that phrase is that's in

1 every card?

2 A. Yeah. So you see that there is three words, which was
3 a mix of upper case and lower case, "NiPpEr is a butt
4 licker."

5 Q. Why would you put a phrase like that in your code?

6 A. Because we were asked to. It was part of -- it was
7 used as a key to implement a specific feature for the
8 set-top box to deal with the card.

9 Q. Who came up with that phrase to put in Smart Card code
10 for a conditional access system?

11 A. It was EchoStar that asked us to do so. They were
12 implementing the set-top box, and they have asked to add
13 that sentence and that feature in the ROM 3 card. That
14 sentence was not in the ROM 2, and we have been asked to add
15 that in the ROM 3 card.

16 Q. What was the point of putting that phrase in?

17 A. I don't know the exact reason. I think it was a new
18 feature used by the set-top box to validate that it's the
19 alleged card used in the set-top box.

20 Q. And so anyone who dumped the EEPROM in 1999 would see
21 that phrase in the code, correct?

22 A. Anyone that can see that dump can read, as we just did,
23 and see the Nipper name, yes.

24 Q. And that phrase was posted on the Internet in '98 and
25 1999 multiple times; isn't that correct?

1 A. I think the very first time I recall having seen that
2 was in October '98, as I said, and probably as every posting
3 on the Internet, information are copy and paste and
4 reproduce on various website in various discussion by
5 hacker.

6 Q. Now, every ROM 3 card uses an answer to reset process
7 to initiate communication with a set-top box, correct?

8 A. Yes, that's correct.

9 Q. And every ROM 3 card allows code to execute in RAM,
10 correct?

11 A. That's correct.

12 Q. Every ROM 3 card had the same buffer overflow
13 vulnerability, correct?

14 A. Yes, that's correct.

15 Q. And every ROM 3 card was subject to memory aliasing,
16 correct?

17 A. Yes, that's correct.

18 Q. And you testified about the Aladdin system, which was
19 the new system. And when were the cards developed for the
20 Aladdin system?

21 A. I think we started working on it on late '99, 2000,
22 that time frame there. Because we were always trying to
23 work on the next generation system, and we had to speed up
24 also then the move-in of Aladdin when the December 2000
25 posting happened.

1 MR. STONE: Your Honor, may I approach with a
2 demonstrative?

3 THE COURT: You may.

4 BY MR. STONE:

5 Q. This demonstrative is numbered A -- A056.

6 Now, in the DNASP-002 system -- and I apologize again
7 for turning my back on you, sir -- there were several
8 versions of the ROM, correct? 2, 3, 10 and 11?

9 A. That's correct, yes.

10 Q. And Nagra made improvements along the way as it
11 introduced these new ROMs?

12 A. Yes. We tried to improve both the hardware, by
13 selecting the latest hardware, and the software.

14 Q. Okay. And I want to make sure we're all clear on
15 something. It's your testimony that the attack posted in
16 December of 2000 could not be applied against the
17 ROM 2 cards, correct?

18 A. Could you rephrase that or repeat that?

19 Q. Sure. It's your testimony that the attack posted on
20 the Internet in December 2000 could not be applied against
21 the ROM 2 cards?

22 A. I think that the one published on the Internet was the
23 recipe for ROM 3 card. The same type of recipe can be
24 applied on ROM 2 card.

25 Q. Didn't you say that the recipe posted in December 2000

1 could not be used against the ROM 2 card?

2 A. That recipe was dedicated to the ROM 3 card, but the
3 same four weaknesses were into the ROM 2, and you can
4 therefore have another recipe for that.

5 Q. And the ROM 10 card was not subject to buffer overflow,
6 correct?

7 A. So as we said, we have introduced a new hardware, the
8 ST19 hardware, for ROM 10 and ROM 11, and that ROM 10 and
9 ROM 11 don't have that ROM ghost effect.

10 Q. And so the attack published on the Internet didn't work
11 against ROM 10 or 11, correct?

12 A. Yeah. The recipe, as is, cannot be work on ROM 10 and
13 11, but the execution of the recipe and the information
14 extracted can be used against ROM 10 and 11, yes, for sure.

15 Q. Now, I'll represent to you that in this case plaintiffs
16 are not seeking to hold NDS responsible for piracy of ROM 2,
17 10 and 11. So for the purposes of my next question, I'm
18 making that representation to you, okay?

19 A. Okay.

20 Q. All right.

21 And the ROM 2 card was first pirated in what time
22 period?

23 A. Let me think. I think it appears about the same time
24 as the ROM 3 card.

25 Q. Didn't you testify it was in the 1999, 2000 time frame?

1 A. Yeah. That's the time frame we were -- since the
2 October '98 until the December 2000, there was various
3 attack and steps done on ROM 2 and ROM 3. So that's really
4 the range that I will give for ROM 2 and ROM 3.

5 Q. And when was the ROM 2 deployed?

6 A. We started with ROM 2, so at the launch of EchoStar.
7 So it will be April '96.

8 Q. And the ROM 3 card was deployed when?

9 A. So probably in early '97.

10 Q. When did it first come to your attention that there
11 were pirate devices for ROM 3?

12 A. Can you repeat that, please?

13 Q. When did it first come to your attention that there
14 were pirate devices for ROM 3?

15 A. So right a few months after the publication of October
16 '98, the so-called battery card was the first pirate devices
17 implementing an emulation of the system. But that emulation
18 of the system is linked to an emulation of the DNASP II
19 family of card. So no matter what the information is
20 extracted from a ROM 2 or a ROM 3, it is usable on the
21 system.

22 Q. And when was the ROM 10 card deployed? March of 2000,
23 I think you said?

24 A. If you say so. I think that's the right period. But I
25 don't know if it's March or April or January 2000. Might be

1 a good guess.

2 Q. So would you agree spring of 2000? Does that sound
3 right?

4 THE COURT: Counsel.

5 BY MR. STONE:

6 Q. Spring of 2000, does that sound right?

7 A. Yeah, early 2000. I don't know exactly.

8 Q. Okay.

9 A. I'm sure you can find out that date.

10 Q. And when was that pirated?

11 A. So as soon as the December 2000 posting appear,
12 information start to be extracted from ROM 3 and started to
13 be used against ROM 10. So I would say starting the
14 beginning of 2001 until end of 2001, we had piracy activity
15 on ROM 10.

16 Q. And when was ROM 11 deployed?

17 A. I will guess one year later than ROM 10 -- one, one and
18 a half. So 2002, 2003.

19 Q. And when did you first learn that was pirated?

20 A. That, I don't recall. I think later on.

21 Q. Now, the new system, the Aladdin system, had a ROM 101
22 and 102, correct?

23 A. That's correct.

24 Q. And when was that first deployed, the 101?

25 A. We started to swap the EchoStar system to Aladdin in

1 2002. So most probably the 101 card was deployed in
2 early -- not say early -- I think it was July, August 2002,
3 sometime like that.

4 Q. And when did you learn that had been pirated?

5 A. So that card have been attacked, I think, in -- in
6 2005, in September, October 2005.

7 Q. Was it before the card swap was completed?

8 A. Yes. It was a few months after the full completion of
9 the card swap.

10 Q. And then the ROM 102 card was also part of the card
11 swap, correct?

12 A. Both ROM 101 and 102 were introduced for new
13 subscribers starting in 2002. So probably about one or
14 two -- let's say one year after the 101.

15 Q. 2003?

16 A. Yeah, that would be my guess. That's a guess.

17 Q. And it was pirated the same time as 101?

18 A. No. I think it was pirated later on. I would say 2006
19 or something like that or 2007. 2006 probably.

20 Q. And is there going to be another EchoStar card swap
21 soon?

22 A. So first those two ROM, 101 and 102, are not the only
23 one of the Aladdin family. The major part of the swap was
24 done with SO.1 and SO.2. And we have a ROM 103 also there.
25 So that's the first things. And we are now planning to move

1 to the new generation of cards, which will be introduced
2 later on.

3 Q. All right. Is there a swap scheduled to occur in 2008
4 for EchoStar?

5 A. That's my understanding, yes.

6 Q. And are those cards being provided by -- for free by
7 Kudelski?

8 A. That, I don't know.

9 Q. How many versions of card does Nagra have deployed
10 currently in the world?

11 A. Can you repeat?

12 Q. How many versions are currently deployed of the cards?

13 A. From one family or every family?

14 Q. From every family. How many different versions do you
15 have?

16 A. I think it represents something like 140 million of
17 cards roughly and something like -- my guess will be between
18 15 and 20 versions. I don't recall -- we need to -- that's
19 the order of magnitude.

20 Q. And the ROM 3's, 10 and 11 are no longer in the field
21 anywhere, correct?

22 A. There is a few system remaining with the 11 still in
23 production.

24 Q. So of the versions that are in the field now, how many
25 of those are not compromised?

1 A. I would say between 50 to 60 percent.

2 Q. Now, earlier we talked about an ASIC. Do you recall
3 that? An application-specific integrated circuit. Do you
4 recall that?

5 A. Yes.

6 Q. And you folks had begun developing that recently?

7 A. I think we started to focus on that in 2004, and since
8 then on we work on developing ASICs and various solution.

9 Q. And an ASIC allows you to customize your card and
10 customize the hardware, correct?

11 A. It's not the only way. We were customizing the card in
12 another way before, but that's the main way, let's say.

13 Q. These are not off-the-shelf chips any longer. You're
14 customizing the logic in the chips?

15 A. Again, I think it -- again, not only the only way to
16 have a not-on-the-shelf chip, but that's the main way.

17 Q. Sir, can you please turn to Exhibit 828, which we'll
18 hand to you. It's in evidence.

19 Okay. Looking down at the bottom, those are your
20 initials next to the box on Exhibit 828, correct?

21 A. So I think, yeah, there are two "CN" that can stand for
22 my name, Christophe Nicolas.

23 Q. And that would mean that you received a copy of this
24 letter, correct?

25 A. Mean that that document had been transmitted to me and

1 most probably received, yes.

2 Q. Did you read this security breach letter?

3 A. I think I've read it during our deposition. I was not
4 recalling that letter before that.

5 Q. Well, look at the first sentence if you would, please.

6 A. Do you have a paper copy of that? It would be useful
7 just for reading.

8 Q. You can use my copy, sir.

9 A. Thank you.

10 Q. Now, the first sentence says, "The purpose of this
11 letter is to formally confirm in writing the discussion
12 between our companies regarding the security breach of the
13 Kudelski SA conditional access and related systems that has
14 occurred."

15 Do you see that?

16 A. Yes, I see that.

17 Q. And given your position with the company at the time,
18 wouldn't you have been involved in discussions with EchoStar
19 about a security breach that resulted in a letter from a
20 lawyer?

21 A. No. I -- at that time I was just really an engineer
22 developing card, so I was not involved in that kind of
23 discussion. I was informed that something was discussed,
24 but that's it.

25 Q. I think at the bottom of that first paragraph it says,

1 "As you know, in February, Kudelski, NagraStar, and EchoStar
2 discussed instructions published on the Internet that permit
3 emulation of the Smart Card."

4 Do you see that?

5 A. Yeah, I see that, yeah.

6 Q. Do you recall being involved in discussions about a
7 posting in 1999, early 1999, that had instructions that
8 permitted emulation of the Smart Card?

9 A. I think that the one I have in mind is that October '98
10 posting where sensitive key have been published that can be
11 used in doing emulation devices such as the battery card
12 against our system.

13 Q. Do you recall any posting that occurred in January of
14 1999 that came to your attention?

15 A. No, I don't recall that.

16 Q. Do you recall when I asked you this morning about the
17 name jazzercz?

18 A. Yeah.

19 Q. J-A-Z-Z-E-R-C-Z. Do you remember that sounded familiar
20 to you?

21 A. Yeah, that's familiar. Yeah.

22 Q. And I believe you testified that to create an emulation
23 device, the pirates would have to have all or part of the
24 ROM code, correct?

25 A. They need to have at least part of the ROM code to do

1 that, yeah.

2 Q. Or perhaps all of it, correct?

3 A. All of it but --

4 Q. Let me show you Exhibit 524 and see if that refreshes
5 your recollection a little bit.

6 And on Exhibit 524, you notice down at the bottom
7 there's a CIS number?

8 A. Yes.

9 Q. And that was Mr. Guggenheim's company, correct?

10 A. Yes.

11 Q. And Mr. Guggenheim could collect things having to do
12 with piracy off the Internet; is that correct?

13 A. Yes.

14 MR. STONE: Your Honor, I would move at this time
15 Exhibit 524.

16 THE COURT: Any objection?

17 MR. HAGAN: Your Honor, this document is hearsay.
18 We produced it, but our objection would be under
19 Article VIII.

20 THE COURT: Who had -- well, strike that.

21 I'll take this up during the recess, Counsel.

22 Subject to a motion to strike, you may continue,
23 Counsel.

24 MR. STONE: Thank you, Your Honor.

25 (Exhibit No. 524 received in evidence.)

1 THE COURT: And you may display the document.

2 MR. STONE: Thank you, Your Honor.

3 (Document displayed.)

4 BY MR. STONE:

5 Q. The heading of this document posted on the Internet is,
6 "Unleash the power of your EchoStar -- A beginner's guide to
7 hacking EchoStar." Do you see that?

8 A. Yeah, I see that.

9 Unleash?

10 THE INTERPRETER: (Interpreter translates.)

11 THE WITNESS: Okay. Yes, I see that. Yes, I
12 understand that.

13 BY MR. STONE:

14 Q. And you see the name jazzercz?

15 A. Yeah, I see that, yeah.

16 Q. Okay. Does that refresh your recollection about what
17 jazzercz had posted on the Internet?

18 A. I was not linking jazzercz to that document
19 specifically. I don't recall that document, but it was one
20 of the nicknames that was around at that time.

21 Q. It's a nickname that you recalled this morning,
22 correct?

23 A. Yeah, that's a nickname that sounds familiar when you
24 mentioned it this morning, yes.

25 Q. And I'd like to direct your attention to Page 2 of the

1 document, the third paragraph, under the heading, "How does
2 this hack work?" It says, "This hack works by replacing the
3 CAM --" that would be the Smart Card, right?

4 A. Yes. CAM probably stands for Smart Card there.

5 Q. With another computer, an 8515 -- and I assume 8515 is
6 a type of processor?

7 A. Yes. That's probably the case there, yeah.

8 Q. "Which is programmed to act like a CAM. However, the
9 8515 is programmed to blindly give permission to all
10 channels." And then it goes on to say that, "In order for
11 the 8515 to act like a CAM, the 8515 needs to be loaded with
12 a program which emulates a CAM." Do you see that?

13 A. I see that, yes.

14 Q. So this would be a description of an emulation attack
15 on the Smart Card, correct?

16 A. Yeah, at least a partial emulation that will give you
17 access to the programming.

18 Q. And this is dated January 30th, 1999, on the first
19 page. Does this refresh your recollection that this was the
20 emulation posting that generated the letter, Exhibit 828?

21 A. No, I don't think so. Maybe, but I don't think it's
22 that kind of things that generate any letter or whatsoever.
23 It's a technical fact there, and I don't think it's the type
24 of document being discussed in business discussion between
25 EchoStar and NagraVision.

1 Q. Was there some other posting in January of 1999 that
2 laid out the instructions on how to emulate the EchoStar
3 Smart Card that you're aware of?

4 A. I think it's -- again, I was not involved in the
5 discussion, but I think it's more the fact that information
6 start flying over on Internet and also those pirate
7 emulation devices called battery card that were starting to
8 appear at that time which creates that need to discuss with
9 our customer the status of piracy.

10 Q. Let's go to Page 3 of the document under the heading
11 "Process." And you see it has an overview of steps. The
12 first step is "Find your secret key."

13 Do you see that?

14 A. I see that, yeah.

15 Q. And then under "Process detail No. 1," it says, "In
16 order for these hacks to work, you need to find the secret
17 key which is contained in your IRD." Do you see that?

18 A. Yes, I see that.

19 Q. An IRD is the same thing as a set-top box, correct?

20 A. Set-top box or receiver, yes, correct.

21 Q. Now, if you go to the next page, there's another way to
22 obtain the key that is shown. It's under "B" at the top --

23 A. I see that.

24 Q. -- or next to "B" at the top.

25 It says, "The easiest way is to get into a special

1 screen on your IRD and find the key. This is the path I
2 took."

3 A. I see.

4 Q. "For some models, the location of the key has already
5 been found for you," and it lists dr7 website and a list of
6 locations, a memory map, if you will. It goes on to say,
7 "To get into your memory dump, you need to press menu and
8 then get into the diagnostics menu. And once in the
9 diagnostics menu, press the following keys on your remote."
10 Do you see that?

11 A. Yes, I see.

12 Q. And then about the middle of the page, it goes on to
13 show the reader what the screen will look like with the dump
14 of the secret key in hexadecimal code, right?

15 A. Yes.

16 Q. And that would show up in a subscriber's home on their
17 TV using their remote control, correct?

18 A. Yeah, that's correct.

19 Q. So a vital part of this hack is having the supposedly
20 secret key, but a subscriber following these instructions
21 could simply use their remote control and pull it up on
22 their TV in January of 1999?

23 A. I think we are just talking about what we have
24 mentioned this morning: That pairing key or that key that
25 is used to marry a card with a set-top box. That's one step

1 we get because we have to have working emulation devices.
2 But that key is unique per set-top box and Smart Card pair.
3 So to have a working emulation devices there, you need to
4 first have the first hack, which is the vital hack; and then
5 to make it work for your own set-top box, you need to
6 extract that key. And I think the problem with the
7 application was to describe the steps needed to access that
8 key in the set-top box.

9 Q. And without that key, the emulation hack would not have
10 worked, correct?

11 A. Correct. Let me rephrase that. It will not work on an
12 existing legit EchoStar set-top box because the rules
13 require the fact that the card and the set-top box is
14 paired, or married, together. If you use another devices,
15 you will not need that key.

16 Q. Now, if we could go back to Exhibit 828, please. I'm
17 focusing on the second paragraph. It says, "Kudelski,
18 NagraStar, and EchoStar have also discussed a fix, involving
19 the swap out of Smart Cards, to be completed in the next six
20 months. The fix, of which the Smart Card swap out is only
21 one piece, is extremely important and must be accomplished
22 as soon as possible."

23 Were you involved in those discussions that fixing
24 the security of breach would require a card swap in the next
25 six months?

1 A. I think I was not involved in that type of discussion,
2 but for sure we were trying to plan any option or
3 possibility to regain the security of the system, one being
4 for sure doing a full card swap.

5 Q. And nobody brought to your attention that your largest
6 customer had demanded a card swap in early 1999?

7 A. I think if I received a copy of that, it was on that
8 purpose to understand that there is ongoing discussion about
9 the various option to regain security on EchoStar.

10 Q. Now, a card swap within six months of the date of that
11 letter would mean a card swap in early 2000, correct?

12 A. Six month means early 2000, yes.

13 Q. Wasn't that when the ROM 10 card was completed?

14 A. Yeah. But I don't think that any swap with ROM 10 was
15 ever mentioned. Because we were not able, as I think I
16 tried to explain you this morning -- we don't have any means
17 to separate or segment the ROM 3 from the other DNASP-II
18 family version.

19 So a swap, to be successful, needs to get rid of the
20 Ontario version of the DNASP-II family and to move to the
21 new generation of family. So partial swap, I think it was
22 not an option there.

23 Q. To be clear, the ROM 10 was not subject to buffer
24 overflow, which was the attack published on the Internet in
25 December 200, correct?

1 A. That's correct.

2 Q. And it was completed in early 2000, correct?

3 A. I think, if you say so, I think, yeah, in 2000
4 somewhere, yeah.

5 Q. Did you ever see a letter going back to EchoStar
6 rejecting its demand for a card swap that was made in July
7 of 1999?

8 A. I don't remember any letter like that.

9 Q. And you testified earlier that there were roughly
10 9.6 million ROM 10 cards produced, right, and shipped?

11 A. Did I say that? I think you said that, and I said that
12 I will trust you if it's so.

13 Q. Do you know how many ROM cards --

14 A. No, I don't know. That's -- I don't know.

15 Q. I assume there would be records of that somewhere?

16 A. Yeah, for sure, yeah.

17 Q. And if EchoStar had 5 million subscribers in 2000 and
18 there was a mixture of ROM 2 and ROM 3, certainly 9 million
19 ROM 10 cards would be sufficient to change every ROM 3 card,
20 though, right?

21 A. Maybe it was mentioned in something because the number
22 of card or set-top box didn't match exactly the number of
23 subscriber because you may have more than one TV at home; so
24 therefore you may have more than one set-top box and
25 therefore more than one Smart Card. So it's hard to do

1 computation match between the number of subscriber and
2 number of Smart Card directly.

3 Q. What was the proportion of ROM 2 to ROM 3 in 1999?

4 Let's take that first. 40/60? 50/50?

5 A. When in 1999? Because that's important.

6 Q. You picked the end of 1999.

7 A. The end of 1999, it's probably, I will guess, roughly
8 the same.

9 Q. 50/50?

10 A. Yeah.

11 Q. And if there's 5 million subscribers and everyone has
12 two set-top boxes, that's 10 million cards total, right?

13 A. Yeah.

14 Q. And if it's 50/50, half of that would be 5 million
15 ROM 3 cards, right?

16 A. 50/50, the number of card, yes.

17 Q. And 9 million is significantly greater than 5 million.
18 You would agree with that?

19 A. Yeah, it's four more million, yeah.

20 Q. And I believe it was your testimony that Nagra did not
21 receive a letter from EchoStar each time there was a posting
22 on the Internet. Do you recall that?

23 A. I recall that, yeah.

24 Q. And EchoStar did not send a letter like it did for the
25 1999 posting after the December 2000 posting; isn't that

1 correct?

2 A. That's correct.

3 Q. So the December 2000 Internet postings were no
4 different than any of the other Internet postings of piracy
5 information that occurred before December 2000; isn't that
6 correct?

7 A. I don't think that you can link those two.

8 Q. Well, isn't it true you don't recall EchoStar demanding
9 a card swap as a result of any Internet posting that
10 occurred in December of 2000?

11 A. Could you repeat that?

12 Q. Sure. Isn't it true you don't recall EchoStar
13 demanding a card swap as a result of any Internet posting
14 that occurred in December of 2000?

15 A. I don't recall any link between a posting and a request
16 from EchoStar, but I was not the only recipient on any
17 request from EchoStar, so it's difficult to say so. On my
18 recollection on my side, I don't see -- and I don't recall
19 that.

20 Q. And nobody came to you and said EchoStar was demanding
21 a card swap because of a posting that occurred in December
22 of 2000; isn't that correct?

23 A. I think nobody needs to come back to me after that
24 December 2000 posting because it was so huge for us in term
25 of damage that nobody have to wake you -- wake me up once

1 more to say we are in big trouble there, and we need to do
2 something very quickly.

3 Q. Well, wait. Didn't you testify that not only did you
4 not recall any letter from EchoStar as a result of the
5 December 2000 postings, but at the time Nagra was thinking
6 more about Christmas cards rather than postings?

7 A. Yeah, you asking me what -- if I receive a letter
8 December 24th, and December 24th the time frame I have
9 receive more Christmas card than formal letter. I think --
10 I hope all of you did, too.

11 Q. So if I understand it correctly, there was no security
12 breach letter from EchoStar as a result of the December 2000
13 Internet postings, right?

14 A. Not I'm aware of.

15 Q. There was no request by EchoStar for a card swap as a
16 result of the 2000 postings that you're aware of?

17 A. I'm not aware of any specific request linked to that
18 one.

19 Q. And from Nagra's perspective, you were thinking more
20 about Christmas cards rather than Internet postings in
21 December of 2000?

22 A. If you want to say that, you can say that, but I think
23 it's out of context.

24 Q. Didn't you become aware that all or part of the ROM
25 code for the ROM 3 card had been posted on the Internet

1 before December 2000?

2 A. Can you repeat that, please?

3 Q. Didn't you become aware that all or part of the ROM
4 code for the ROM 3 cards had been posted on the Internet
5 before December 2000?

6 A. That might be the case, that partial memory of the ROM
7 code have been extracted and then exchanged on Internet
8 amongst various people talking about the access. That's
9 possible.

10 Q. And do you recall that the memory access control matrix
11 in the ROM 3 card was set to prevent access to the system
12 ROM from any other portion of memory?

13 A. So the memory access control cannot be set to control
14 the system or memory by us, at least. So my understanding
15 is that you cannot access what is called the system ROM,
16 which is the part of the software that is -- is put by ST in
17 the ROM. And even if you have full access on our user ROM
18 and on our code, and even if you have a pirate code executed
19 in the code, you don't have any means to access that memory
20 location -- so the 2,000 to 4,000 memory location. And
21 that's probably the member access that avoid that. But it's
22 not under the control of us, meaning Nagra, to set up that.
23 It's really ST that set up that on purpose.

24 Q. So to be clear, you can't use a buffer overflow method
25 to obtain a system ROM from a ROM 3 card, correct?

1 A. You cannot use -- you cannot -- yeah, you cannot take
2 advantage of a buffer overflow to inject a pirate code in
3 the card, and then that pirate code cannot extract the ROM,
4 the ST system ROM part. So you can extract the user ROM,
5 you can extract the EEPROM, but you cannot extract that part
6 of the memory.

7 Q. And do you recall pirates by the name of magma, macro,
8 xchi, and piper posting portions of the ROM code and the
9 system ROM code on the Internet before December 2000?

10 A. I recall some of those nickname. I don't recall those
11 nicknames linked to the fact that you mentioned.

12 Q. If you could look at Exhibit 1448, please. Looking at
13 Exhibit 1448, it begins with an e-mail to you from
14 Mr. Guggenheim?

15 A. Yes.

16 Q. And it's dated -- sorry, it's in French?

17 A. August '99.

18 Q. August 1999?

19 A. Yes.

20 Q. And this document appears to have a collection of code,
21 analysis of pirate code and postings. Is that a fair
22 summary of it?

23 A. Are we still talking about the first page or the 200
24 other pages?

25 Q. No, it was produced to us in this collection of pages,

1 so I assume this is the way it came out of your files?

2 A. I don't know.

3 THE COURT: All right. Counsel, your next
4 question.

5 MR. STONE: I'd move Exhibit 1448 in so I may
6 publish it.

7 THE COURT: Any objection?

8 MR. HAGAN: Your Honor, we've got no objection
9 subject to a motion to strike.

10 THE COURT: It's received.

11 (Exhibit No. 1448 received in evidence.)

12 BY MR. STONE:

13 Q. Okay. Mr. Nicolas, I'm going to focus your attention
14 on Page 54 of Exhibit 1448.

15 Okay. There's some handwriting on this page that is
16 titled "E_ROMS.txt" at the top.

17 Do you know whose handwriting is on here?

18 A. Yeah, that's probably mine.

19 Q. And where it says "Released code" in about top middle
20 of it, "released code" would mean portions of the ROM code
21 posted on the Internet, right?

22 A. Yes, most probably.

23 Q. And right above "released code" to the left it says,
24 "E, underscore, ROM, info, exclamation point."

25 Do you see that?

1 A. Yes, I see that.

2 Q. And do you recall that there was an E-ROM piracy forum
3 on the DISH plex website?

4 A. That I don't remember, no.

5 Q. Do you recall that these portions of the code were
6 posted on the DISH Plex piracy website?

7 A. I don't recall that. Maybe it have been posted. I
8 don't know if it was in that place and that time, so I don't
9 have the detail on that.

10 Q. How did you get this code?

11 A. So probably those are information coming out of the
12 monitoring activity that we were doing on the Internet. So
13 by just looking and reading all those forum, we were trying
14 to extract the information that shows us that there is an
15 evidence that information have been published out of our
16 card.

17 Q. Now, on this Page 54 where you wrote "ST" next to the
18 portion of the code released by magma -- do you see that?

19 A. I see that.

20 Q. That's a reference to the ST micro system ROM, correct?

21 A. Most probably, yeah.

22 Q. Well, you can tell by the address, can't you?

23 A. Yeah, the address fit the thing. What I cannot tell is
24 that if the bytes after the address are the right one or
25 not. I recall the first two, but the rest I don't know.

1 Q. Okay. Look at Page 56, please.

2 A. Yes.

3 Q. Is that your writing that says DNASP-003 above the code
4 released by XG?

5 A. Correct.

6 Q. And so this would be ROM code from a ROM 3?

7 A. If my handwriting is correct on top of that, yes.

8 Q. And to make sure there is no confusion, we talked
9 earlier about the DNASP-II system and I think that's DNASP
10 with a Roman Numeral II?

11 A. Correct.

12 Q. That's the overall system.

13 A. That's what I call a family.

14 Q. And what we see in documents DNASP with a 003 or a 002,
15 that's the ROM version, correct?

16 A. That's what we call ROM 2 or ROM 3, yes.

17 Q. And I believe you testified that the system ROM could
18 not be accessed by a buffer overflow method, right?

19 A. I think I've testified that the system ROM cannot be
20 accessed by a pirate code injecting using that weaknesses,
21 correct.

22 Q. Do you know how the pirates were able to get this code
23 that they posted on the DISH Plex piracy website?

24 A. No. Most probably they have been given the
25 information -- they've done themselves what I call an

1 invasive attack to access, to extract, and to dig into the
2 chip to extract that memory location.

3 Q. Did Mr. Gee or Mr. Guggenheim of NagraStar ever inform
4 you that they knew there was a piracy lab in Thunder Bay,
5 Ontario used by the DISH Plex piracy group?

6 A. I don't recall being informed about that, no.

7 Q. Do you ever hear the name Dennis Renaud?

8 A. That doesn't sound familiar, no. I don't know the name
9 of the people really. I'm used to see some nicknames, but
10 not the names of the real people.

11 Q. Did Mr. Gee maintain a database of information that he
12 collected on various pirate organizations that you're aware
13 of?

14 A. I know he's working like that, but I don't have access
15 to that database.

16 Q. If you go to Page 61 of Exhibit 1448, please.

17 Near the bottom it says, "Now let's start hacking," two
18 exclamation points, and it's signed, "cyberjaak and the DISH
19 Plex crew."

20 Do you know who cyberjaak was?

21 A. No, I don't remember that name.

22 Q. Is the name DISH Plex familiar to you?

23 A. Till a few hours, yes.

24 Q. Let me show you, please, Exhibit 526.

25 Do you have Exhibit 526 in front of you, sir?

1 A. Yes, I do.

2 Q. Okay. The first page appears to be an e-mail from
3 Suzanne Guggenheim, dated June 25th, 2000, to a number of
4 people including yourself, correct?

5 A. That's correct, yes.

6 Q. And this appears to be three attachments to the e-mail,
7 correct?

8 A. That's correct.

9 Q. And this would be the type of e-mail that you would
10 receive from Suzanne Guggenheim when she was reporting on
11 piracy developments, right?

12 A. That's correct, yes.

13 MR. STONE: Your Honor, I would move 526.

14 THE COURT: Any objection?

15 MR. HAGAN: No objections, Your Honor.

16 THE COURT: Received.

17 (Exhibit No. 526 received in evidence.)

18 BY MR. STONE:

19 Q. Show you the first page. There we go.

20 (Document displayed.)

21 BY MR. STONE:

22 Q. Okay. If we go to the top, this is dated June 25th,
23 2000, from Suzanne Guggenheim, so this would be six months
24 before the December postings roughly, correct?

25 A. That's correct.

1 Q. And what is the subject of this e-mail?

2 A. EchoStar Network EE-ROM Info and News.

3 Q. And what do you understand that to mean?

4 A. I think it's probably discussion about people that
5 are -- had access to a few byte of the EEPROM at that
6 time -- EEPROM or ROM at that time.

7 Q. About the middle of the page or top middle, it says,
8 "DISH Network EE-ROM info," and underneath that it says,
9 "Welcome to E-ROM Central."

10 Do you see that?

11 A. I see that.

12 Q. And do you recall E-ROM Central was a part of the
13 DISH Plex website?

14 A. No, I don't recall that. I was not aware of that.

15 Q. Look at the second page, if you would, of the document,
16 Page 2 near the top, and see if that refreshes your
17 recollection under the June 14th, 2000. Do you see where it
18 says, "For the people who have visited DISH~Plex in the
19 past"?

20 A. Yes, I see that.

21 Q. Does that refresh your recollection that the E-ROM
22 Central was part of the DISH~Plex website as well?

23 A. No, still not. Sorry.

24 Q. Okay. Go back to the first page if you would, sir.

25 Now, it looks like what Ms. Guggenheim did was to

1 essentially cut and paste some information off of this
2 website and forward it to you and others, correct?

3 A. Apparently, yeah.

4 Q. At the bottom of the first page, do you see where it
5 says, "Here it is," explanation point? E-Star hacking FAQ
6 103199. Now, FAQ would mean "frequently asked questions,"
7 correct?

8 A. That's correct, yes.

9 Q. And it says, "An excellent FAQ by Stuntguy. Do you see
10 that?

11 A. Yeah, I see that.

12 Q. And did you ever learn that there was a hacker who
13 seemed to be particularly knowledgeable about the EchoStar
14 system called Stuntguy?

15 A. Yeah, I fully remember that, yes.

16 Q. And do you recall that Stuntguy regularly published a
17 thick, frequently-asked-questions manual on how to hack
18 EchoStar?

19 A. Yeah, that's correct. I think Stuntguy was one of the
20 main active pirates that was collecting all information EC
21 on the dr7 or EC from various people and just putting that
22 FAQ to make sure that, yes, the full copy of all public
23 information that he has seen on the web. And I think it was
24 a very well-written document there.

25 Q. Are you aware that we located Stuntguy in this lawsuit?

1 A. Yeah, apparently I've learned that, yes.

2 Q. And are you aware his name is Christopher Dalla?

3 A. During the discovery, yeah.

4 Q. And are you aware that he did much more than just clip
5 things from website postings?

6 A. No.

7 Q. Are you aware that he had the ROM 2 and ROM 3 ROM code
8 before the postings?

9 A. No, I was not aware of that.

10 Q. Look down at the bottom here where it says "EsROM2.zip"
11 at the very bottom of the first page.

12 A. Yeah, I see that.

13 Q. Now, we've talked about what a zip file is, correct?

14 A. Yes.

15 Q. And ROM 2 would be a version of the EchoStar access
16 card, right?

17 A. Yeah, most probably, yes.

18 Q. Well, and right underneath that, doesn't it say,
19 "Publicly available EchoStar ROM dump and commented
20 disassembly"?

21 A. Yes.

22 Q. And wasn't that the zip file that Mrs. Guggenheim
23 attached up at the top that says EsROM2.zip?

24 A. It might be that.

25 Q. And you testified earlier these zip files are very

1 important to engineers, correct?

2 A. Yeah. As a Microsoft Word and other office things,
3 yes, it's a nice tool, too, not only for engineer. But,
4 yes.

5 Q. What happened to this file with the EchoStar ROM dump
6 fully commented and disassembled by Stuntguy that was
7 attached to this e-mail?

8 A. I don't know.

9 Q. Did you ever look at it?

10 A. Maybe at that time. Most probably if I receive it, I
11 have a quick look at it, yes.

12 Q. And what does it mean to have commented disassembly of
13 ROM code?

14 A. I think that just the fact that pirates start to works
15 on the code itself and try to understand the code itself.

16 Q. By disassembling it, they convert it into higher
17 programming languaging, correct?

18 A. Not that kind of code, but at least you can have that
19 in human-readable language, yes, which is assembly code.
20 It's not called that high level language.

21 Q. Human readable?

22 A. Human readable.

23 Q. Fair enough. And "commented disassembly" means that in
24 addition to making it human readable, it is commented to
25 explain what is going on in the code; isn't that right?

1 A. Yeah, they probably have commented and put their
2 understanding of what piece of software is doing what in the
3 code.

4 Q. Were any further steps taken by NagraVision after
5 receiving this e-mail from Suzanne Guggenheim with a
6 commented dump of the ROM 2 code?

7 A. Not in this specific one. I think we just continue our
8 works to try to combat piracy and take the appropriate
9 reduction to try to keep the system as secure as possible.

10 Q. And the ROM 2 code was very similar to the ROM 3 code,
11 correct?

12 A. I think most of the part of the code was similar. Some
13 have been rewritten to integrate, as we explained before,
14 the bugs that were in the patch. So you have to rewrite
15 that part, but some parts have been equivalent or, yeah,
16 identical.

17 Q. Did Mr. Osen deliberately fail to check the length of
18 incoming messages in the communications buffer in the ROM 2
19 code?

20 A. Could you rephrase that? I don't understand that
21 really.

22 Q. Did Mr. Osen deliberately fail to check the length of
23 incoming messages to the communications buffer in the
24 ROM 2 card?

25 A. I think it was not a failure. It was a great

1 improvement to achieve the specification required for the
2 card. And I think it was a way to show his extensive
3 knowledge on how to use the hardware, the specific hardware,
4 and to write a very efficient code to reach that
5 specification.

6 Q. Did Mr. Osen show that specific knowledge in the
7 ROM 2 card?

8 A. Definitely, yes.

9 Q. Mr. Nicolas, do you have still handy Exhibit 1278,
10 which was your declaration?

11 THE COURT: I don't have it in front of me.

12 MR. O'DONNELL: You have it.

13 THE COURT: Find it. Just a moment, Counsel.

14 MR. O'DONNELL: (Complies.)

15 THE COURT: Counsel, move on to your next area,
16 please.

17 BY MR. STONE:

18 Q. Am I correct, Mr. Nicolas, it was your testimony that
19 immediately after the December 2000 Internet postings
20 NagraCard and plaintiffs took two measures to counteract the
21 postings?

22 A. I think yes. Just after the posting, we started to
23 first attack the already modified card that have been
24 modified by that recipe as is, and we start also the
25 deployment of a patch that was trying to close the usage of

1 the recipe as published on the Internet.

2 Q. And this was done immediately upon learning of the
3 December 2000 publications, correct?

4 A. Yeah. It took us something like two months or one and
5 a half months to really finish the design of the things,
6 making sure that we do all the appropriate test, transfer
7 that file to NagraStar, do all the validation with the
8 set-top box, and then finally broadcast that mid of
9 February 2001.

10 Q. I'm focusing on the fact that it's your testimony that
11 immediately upon learning of the postings, you began that
12 process.

13 A. Yes.

14 Q. Right. All right. And two things were done. A
15 software patch was created, right?

16 A. Correct.

17 Q. And the purpose of the software patch was to send the
18 two lines of code that would check to make sure --

19 A. No, no. It would have been very simple to do that.
20 But the way the communication was designed in ROM 3 doesn't
21 allow us to just one or two line there because we were
22 already running out of time. We don't have the times to add
23 any line there because, remember, it was in the
24 communication between the set-top box and the card. And we
25 were already almost finished with the reception of the byte,

1 and it remain six clock cycle, which is very, very few
2 millisecond, to start receiving the next byte. So by no
3 means we can add using that design or that structure of the
4 code. By no means we could add a simple check as those two
5 line of code there.

6 So we have to completely rethink and rewrite that part
7 of the code. And the patch that we have send to the card
8 there is multiple line of code that's really clearly changed
9 the behavior of the card in order to try to fix that -- that
10 attack.

11 Q. Sticking with the patch first. The patch was sent as
12 an upgrade or an update to the EEPROM through the satellite
13 signal, correct?

14 A. Yeah, exactly. The patch is developed in Cheseaux,
15 sent to NagraStar in a file, loaded in the broadcast center,
16 and then broadcasted through the satellite to all Smart
17 Card. And the Smart Card will receive that message and
18 store that in EEPROM.

19 Q. And how many patches had been used on the ROM 3 card
20 prior to this point in time?

21 A. I don't know exactly, but I think a few -- let's say
22 two dozen, something in that if I have to guess.

23 Q. Pardon?

24 A. Two dozen.

25 Q. So there were two dozen software patches to the ROM 3

1 card prior to December of 2000, correct?

2 A. Yeah, posting in order to fight piracy or to add
3 feature in the card.

4 Q. And did you write the patch code for the ROM 3 card?

5 A. Maybe the very first one, but then I was not doing any
6 more coding on that card. It was other people doing the
7 coding.

8 Q. As you sit here today, can you describe for the jury
9 what the patch code did?

10 A. Sorry?

11 Q. Can you describe what the patch code did?

12 A. Which one? That given one?

13 Q. Yes.

14 A. So many that we -- we did with the patches completely
15 rewriting the communication of the way we manage
16 communication between the set-top box and the card. And in
17 order to do that, we had to change the structure of the
18 code. It will start to be technical -- sorry about that --
19 but the previous code was managed and the previous
20 communication was managed by using an interrupt. So it's a
21 specific way to detect beginning of the communication and to
22 then deal with the communication. And we have to get rid of
23 that and implement a new way, which is called polling. We
24 need to manage the communication using polling, so we wait
25 for the information, and we check each time if something is

1 coming. If it's not coming, we go back to the the number
2 state.

3 So we have to completely rewrite that in order to find
4 the time in term of clock cycle to do that check. And that
5 check has been added in the patch on top of the ROM code.

6 Q. This is done in about six weeks, correct?

7 A. I think the design of the various option have to be a
8 bit before because when we have seen the block box, I think
9 I mentioned -- that's in October, November, 2000 -- we were
10 already thinking about that. The completion of the patch
11 according to that given recipe was finished somewhere in
12 January or end of January 2000.

13 Q. I'm confused. You told the Court that immediately upon
14 learning of the December 2000 publication, NagraCard and
15 plaintiffs began efforts to design and deploy software
16 patches aimed at mitigating the exploit of the published
17 characteristics.

18 A. Yes.

19 Q. Why didn't you immediately begin preparing those
20 patches after you obtained the black box?

21 A. I think we stopped thinking about the design, but
22 again, we were not sure exactly -- two things there.

23 First, it was not technical-wise a very simple patch to
24 do, because when you have to completely rewrite that, you
25 change the design of your software.

1 And the second thing is that for us it was a key
2 information, a key piece of information, that ROM ghost
3 effect that have been brought to us. And as soon as we
4 start doing a fix around that ROM ghost effect, we will
5 finger-point the fact that the weakness exist in the card.

6 And at that time it was pretty simple. Either we -- we
7 broadcast a patch as soon as possible to try to fix the
8 issue or we get prepared in order to do that as soon as the
9 information is being -- to be published or being there.
10 Don't forget until that time there was only one source of
11 pirate devices. So one guy out of us, then, knowing that
12 ROM ghost effect.

13 And you need to be aware that each time we were doing a
14 patch on the card, a lot of hacker were following what we
15 were doing because they had the secret key to disscramble
16 the patch, so for them the patch was in the clear. So they
17 were able to understand and to learn from the card.

18 So as soon as you start doing a patch on that very
19 specific buffer overflow using the ROM ghost effect, you
20 just publish to the world that weaknesses. And we've seen
21 the impact of that December 2000 publication. So, then you
22 are there and you sit and you say, "Okay, let's get prepared
23 to do that patch as soon as something happens, but don't
24 burn ourselves directly by sending that patch over the air
25 and just showing to the world the weaknesses in the card."

1 Q. Sir, if the patch had been designed and deployed prior
2 to the Internet posting, would the so-called recipe that was
3 posted allow anyone to overflow to the buffer?

4 A. Can you we repeat that?

5 Q. If the patch had been designed and deployed after the
6 black box and before the Internet posting --

7 THE COURT: Remind the jury the date of the black
8 box, Counsel.

9 BY MR. STONE:

10 Q. Sure. The black box, I believe the testimony was
11 September of 2000?

12 A. October 2000.

13 Q. September, October of 2000. Fair enough. If a patch
14 had been designed and deployed immediately after the black
15 box came to light and before the postings, isn't it true the
16 instructions posted on the Internet could not have been used
17 to overflow the buffer?

18 A. I think we will have been given the first -- yeah. We
19 will have shown to the hackers where to focus on to try to
20 understand the recipe. It will not have been the full
21 disclosure of the recipe because a patch is a way to avoid
22 the usage of something so it didn't give you the full recipe
23 as is, but it will at least focus the hackers on where to
24 look and how to look to try to understand that.

25 But as I mentioned before, you need four key

1 characteristic. You need to understand four key
2 characteristics of the card, the RAM ghost effect being one
3 and the buffer overflow being another one, and so you still
4 missing at least two very key specific information.

5 So you are giving up a few of those secret, not the
6 full secret.

7 Q. So I'm sorry, sir. Was your answer yes or no?

8 A. Can you repeat the question, then?

9 (Live reporter switch.)

10 (Further proceedings reported by Jane Rule in
11 Volume IV.)

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2
3 CERTIFICATE

4
5 I hereby certify that pursuant to Section 753,
6 Title 28, United States Code, the foregoing is a true and
7 correct transcript of the stenographically reported
8 proceedings held in the above-entitled matter and that the
9 transcript page format is in conformance with the
10 regulations of the Judicial Conference of the United States.

11
12 Date: April 16, 2008

13
14
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