

1 IN THE UNITED STATES DISTRICT COURT

2 FOR THE DISTRICT OF OREGON

3 EUGENE DIVISION

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5 ADASA INC.,)
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7 Plaintiff,) No. 6:17-cv-01685-MK
8 vs.) July 14, 2023
9 AVERY DENNISON CORPORATION,) Eugene, Oregon
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Q. And when you first read Mr. McAllister's patent, you previously testified that you were rather surprised by what you read; correct?

A. I was surprised. He was looking at the problem very differently than we had been articulating and encouraging people to think about it.

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Q. Dr. Engels, this is the draft that you authored of the chapter of *RFID for Dummies*; correct?

A. That's correct.

Q. You wrote this before you had ever read Mr. McAllister's patent; correct?

A. That is correct.

Q. And a portion of this text is about using decentralized systems to avoid network connectivity issues; correct?

A. That is correct.

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Q. So in commenting on the meaning of the portion of *RFID for Dummies* from pages 238 to 240, you commented on the meaning of that portion in isolation from the other references to bits and binary in other portions of *RFID for Dummies*; correct?

A. I wrote it, so I didn't need to refer to anywhere else.

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Q. And you mentioned a keyword in your answer there,
Dr. Engels, that I think there might be some confusion at this
stage about what it means. You used the word "representation."
What does that mean relative to an EPC?

A. So, again, the original concept of the electronic

1 product code that we developed back in the late '90s was that
2 you have this -- this dumb number. And it really is not a
3 single number, it's the combination of multiple numbers.

4 And we did analysis and wrote papers and said the
5 optimum level from allocation hierarchy and a management
6 perspective is three: You have the manufacturer, the product,
7 and the serial number. And the retail industry figured this out
8 many, many years ago, they just couldn't figure out how to do
9 serial numbers with barcodes. So you have manufacturer, the
10 product, and the serial number.

11 And that's just an allocation hierarchy. It's that
12 combination of three numbers that must be unique for you to be
13 able to identify a particular item, and then you can track that.

14 So how you represent those three numbers is important.
15 And as I testified earlier, the representation could be human
16 readable. The URI is one form. And that's actually what the
17 databases are using. It's typically stored like that in the
18 databases, EPCIS databases.

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Q. And in the 2003 -- or in the 2000s to May 2008 time frame in the RFID industry, was the RFID industry using decimal or binary representations?

A. Yes, they were.

Q. And how popular were decimal representations in the RFID industry during that time period?

A. Everything that wasn't in the tag itself was all in decimal representations.

Q. Why?

A. It's the language as humans that's been noted here. Again, it's just because that's how we think, that made it easy for communication. And initially, it was because we didn't trust the computers, so we wanted to look at it all and understand it and it just kind of stayed that way.

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Q. And as the RFID industry was using decimal representations during this time, were there any problems that came about during that time period?

A. Not because we were using decimal. It was really starting to -- early on, everything was very small. When you've got a very small controlled system, no problems because you can control it. But as soon as you start scaling up, new issues arise.

So there were scaling issues, such as how do I manage the assignment of numbers across multiple domains when I don't have this connectivity. So this is one of -- one of those scale problems that you really only capture when you actually start to scale.

Q. And you mentioned "scale" a few times. What do you mean by scale or scaling up?

A. So thinking specifically about RFID, if I'm tagging items, if I'm reading that only in one location, that's -- that's actually pretty easy, particularly if I'm tagging them in only one location. I can control all of that.

As soon as I go to multiple locations, even if it's just two lines in the same facility, I now have a scale problem. So how do I make sure that the line 1 and line 2 are not assigning the same unique identifier to two different items?

And that immediately comes up, so that's where you

1 start giving the range of numbers, 1 to a 1,000 here, 1,001 to
2 2,000 there, and just move on. But you have to manage it. You
3 just can't have it all connected up to that device. You have
4 one central controller, particularly if you start going across
5 the facilities.

6 So I have a manufacturing plant in Ohio and a
7 manufacturing plant here in Oregon, it's kind of hard to say,
8 hey, Fred, I'm going to use 3,001 to 4,000 today because, you
9 know, Fred's a few thousand miles away. So how do you manage
10 that type of scenario? That's where you need to have a little
11 bit of communication, at least. The more you have, great. But
12 surprisingly, even today, communication is still a problem.

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Q. And so if Mr. -- I believe you testified that Mr. McAllister was approaching the problems of the RFID in a different way; is that accurate?

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A. Correct.

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Q. And how was he approaching it in a different way?

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A. So Mr. McAllister, instead of looking at it from the -- the digital perspective, he was looking at the problem of how do I ensure uniqueness of the serial numbers from the binary or the digital perspective, looking at the tag representation specifically, how do I assign serial numbers looking at that bit line representation as opposed to simply saying let me give you a range of numbers from 1 to a 1,000.

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Q. You mentioned the ranges of numbers. Was ranges of numbers a popular representation prior to Mr. McAllister's patent in the RFID industry?

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A. It was my experience that assigning a range of numbers to different manufacturing facilities or lines was, in fact,

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1 very popular, very common prior to 2008.

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6 Q. When you first saw Mr. McAllister's patent, what was
7 your reaction to it?

8 A. I thought it was a very novel approach to solving the
9 problem. It's got some aspects of it that are really subtle
10 that we have not talked about that I found very interesting and
11 very appropriate for scalability and usability in a broad range
12 of context for RFID technologies.

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11 Q. And would you go ahead and continue with your
12 explanation, please, sir?

13 A. Correct.

14 So when you start looking at ranges of numbers, again,
15 because we tend to look in a decimal world, we would normally
16 go, you know, maybe 0 to 9, if you're a computer scientist, you
17 count from zero, but usually it's 1 to 10, and then 11 to 20,
18 because we're counting in decimal and giving allocated ranges in
19 decimal, and those all get converted into binary. The binary
20 representations do not respect bit boundaries. If you're
21 assigning decimal numbers that are human ranges, and then when
22 you do the conversion to binary, there's no fixed most
23 significant bits values unless -- you have to really choose your
24 decimal numbers correctly, which is you choose your binary
25 numbers, you then convert them to decimal.

1 But in general, we're looking at 1 to 10, 11 to 20,
2 and those will not have fixed most significant bits throughout
3 their entire ranges.

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Q. And so at the time that you helped develop the EPC, Dr. Engels, were you thinking about -- what were you thinking about the serial number space portion of an EPC?

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A. We were thinking it was just a dumb number.

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Q. And what do you mean by a dumb number?

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A. So a dumb number is -- it doesn't encode any information at all. It's just a number that is generated, does not get translated or otherwise encode anything. It's just the simple way would be to increment from 1, but you can increment by tens if you so wished.

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Q. And what does that mean, increment? Can you give an example of what that would look like?

21

A. That's just the simple, you know, I go from the first item gets serial number 1, second gets serial number 2, third gets serial number 3, et cetera.

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Q. And why was the EPC teaching that type of serial number?

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1 A. Because, again, we were looking at storing all the
2 information, not in the tag itself because that increased the
3 cost of the tag, we were looking at storing all the information
4 about an item in the databases themselves. So you would look to
5 the database for any information about a particular item as
6 opposed to looking at anything that would be stored on the item
7 itself.

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24 Q. And so, Dr. Engels, when you were -- what were the
25 other pieces of information in the EPC? We've talked a little

1 bit about the serial number. How many pieces of information
2 were part of the electronic product code?

3 A. So the electronic product code -- and this is the
4 general identification scheme now -- was simply the manufacturer
5 number, the product number, and the serial number.

6 Q. And what types of information did you want not to be
7 stored in the tag but to be identified in each of those fields?

8 A. So each of those fields really represented an
9 allocation hierarchy. So GS1, the Uniform Code Council
10 initially would allocate the manufacturing numbers, and those
11 really identified that first layer of hierarchy in that
12 allocation scheme, and they had a certain number they have, and
13 this is really mimicking what's in the barcode today.

14 Then you have the product identifier, and those two
15 would be able to identify the product itself. So you know that
16 it's Tide with bleach, 64-ounce, just based on that, and then
17 the serial number would be allocated by whichever division is
18 managing the Tide, and that would just be unique for that
19 instance. And that allows you to uniquely identify a particular
20 instance of Tide with bleach, 64-ounce, and, therefore, track
21 that particular instance throughout.

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Q. And I believe you testified earlier that the EPC taught the adopters of this standard not to carry information in the serial number space; is that correct?

A. So the Auto-ID Center and EPCglobal initially -- again, we recommend if you're going to store any information in a tag, you do not do it in the identification space. You store that information in user memory space. And the tags of today, most of them have a little bit of user memory that is used if you really have to do that, but we really prefer if you just store it back in the back-end database.

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Q. And you're mentioning the 2004/2005 time frame. Why was that an important time frame relative to the EPC development?

A. So in 2003, we transitioned from the Auto-ID Center to EPCglobal. That is the Uniform Code Council licensed all the technology and patents that we had developed at MIT in the Auto-ID Center and then under the EPCglobal name plate, which is a wholly-owned subsidiary of the Uniform Code Council, GS1 today -- too many acronyms -- that -- that consortium started to develop the actual standards.

So the Auto-ID Center, we made a lot of recommendations, we evaluated them in the field trials that we discussed earlier. And then based upon all of those experience of the technology, we then went into the real world. And this is where companies would have, you know, other ideas and -- and

1 issues that they would bring to the table, and then started
2 developing standards so that everyone could develop technology
3 to those standards.

4 Q. And I believe you mentioned in this time frame that's
5 when the EPCglobal generation 1 tag data standard came out; is
6 that accurate?

7 A. Correct.

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Q. So as this problem began to develop, I think you mentioned the word "scalability." How did scalability impact or interact with the problem you were describing?

A. So scalability is really one of connectivity. So when you have everything local, it's very easy. I could run more wires or start yelling across the room, just go, "Fred, these are the numbers I'm using."

But when you start scaling, particularly across the country as many of these companies are, really not just national but global, you start having issues with intermittent connectivity, you're out in a rural area with literally 96k baud

1 cable on dialup and you can't run that 24 hours a day. So you
2 start having these limited connectivity issues that, you know,
3 when you live in Boston, you go, well, doesn't everybody have T1
4 lines coming into their offices and it's great? No.

5 You start seeing the real world issues and start
6 figuring out what are the issues, and we saw many of those in
7 our field trials and started developing solutions and
8 recommendations at that time. But we also continued to see them
9 as we started to deploy as we continued to help our sponsor
10 companies deploy the technology.

11 Q. As the real world started experiencing these problems
12 given that the decimal representation was the most popular one
13 at the time, how did companies in the real world try and solve
14 this connectivity/scalability problem in real time around 2005,
15 2006?

16 A. Again, the biggest one was, instead of allocating, you
17 know, one number at a time because you're connected to the
18 back-end database, you would start allocating blocks of numbers.
19 The problem when you start saying, "Oh, I'm going to give you 10
20 million numbers," is now you start having inefficient use of
21 that numbering space. If you're only going to use 500 of them,
22 why am I giving you 10 million? That's part of the issue.

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21 Q. And, Dr. Engels, you helped invent this game-changing
22 EPC number. Were you trying to solve this real world problem in
23 2005 and 2006 yourself?

24 A. Well, we were all trying to solve, you know, these
25 real world scalability problems that we were all experiencing.

1 Each company was looking at it in a different way, but a lot of
2 solutions that I saw that were coming up were all very, very
3 similar. Again, worried about -- don't want to put too much or
4 too little, and how do you start solving it, but it was always
5 from the perspective of let's have an incrementing number, let
6 me give you a range of numbers, and then from that range, you'll
7 be able to allocate a certain number to line 1 and line 2, and
8 as long as I don't give you too small of a range, you'll have
9 enough numbers to be able to manufacture what you need to
10 manufacture.

11 Q. The problem you're describing in this time frame, did
12 anyone have a great solution prior to May of 2008 for it?

13 MR. SECCO: Objection. Foundation.

14 THE COURT: Overruled.

15 THE WITNESS: The solutions, again, were all looking
16 at the numbers themselves. Some companies had other issues,
17 again, counterfeit issues. Some companies had great
18 connectivity, and some had poor connectivity, and some had both,
19 depending on where they were. So it really depended on the
20 company. But all of the various versions that I was involved in
21 were all versions of let me give you a range, and then let's
22 increment through that range so that you can have enough to
23 manufacture.

24 BY MR. ORMAN:

25 Q. And when you say "range," are you talking about

1 decimal bunches of numbers?

2 A. Everything was allocated in decimal numbers.

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20 Q. And is the -- you were talking about decimal ranges of
21 numbers. Is that what you were describing in that chapter of
22 *RFID for Dummies*?

23 A. Yes, it is.

24 Q. And why is that?

25 A. Because that's what we were doing at that time.

1 Again, the -- you know, I was looking at what we were we doing
2 to solve these problems. And, you know, it's not magic, I give
3 you a range of numbers and then you start allocating from that
4 range different ranges for different manufacturing production
5 lines. But, you know, again, not encoding information, storing
6 all that in the EPCIS, because there's a lot more information
7 you want to record, so you're going to do that anyway, so why
8 burden the number with any information. Again, sticking with
9 the philosophy is it's just a dumb number.

10 Q. So is it fair to say the solution that you wrote about
11 in *RFID for Dummies* didn't solve the real world problems you
12 were discussing?

13 A. It was simply that range of numbers solution.

14 Q. And did you think that when you contributed to *RFID*
15 *for Dummies* in 2005 that you had just disclosed a brand new
16 invention?

17 A. Absolutely not.

18 Q. Why not?

19 A. Because it was backwards looking. So, again, this is
20 what we were doing, we'll give you a range of numbers. From
21 that range, you'll start allocating other sub-ranges to your
22 various production lines.

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25 So how did Mr. McAllister's invention differ from what

1 we had just been describing about the solutions that were out
2 there prior to May of 2008?

3 A. So again, prior to Mr. McAllister's, we were all
4 thinking and everyone I was talking with and working with, the
5 numbers were being allocated on a decimal basis, so give you
6 decimal ranges for serial numbers. Mr. McAllister said, well,
7 I'm going to look not at something that generic that's
8 appropriate for human readable and human understanding, I'm
9 going to look just at the RFID encoding, so very much at the
10 lowest level of the stack, which we had not been doing, never,
11 because we were always concerned with the high-level solution,
12 that holistic view of how does all of this fit together.

13 Mr. McAllister was looking at a very specific
14 implementation in the RFID tags and how you do this with an
15 encoder that's out in the field and may have very, very
16 intermittent connectivity, so how do you manage that and ensure
17 that uniqueness without compromising other aspects of the
18 system.

19 Q. So how did Mr. McAllister, looking at the problems of
20 the real world in a different way, influence what became his
21 invention?

22 A. So ultimately, he was -- because he was looking at it
23 from the low level, his solution is, well, if I create these
24 blocks of numbers but I have most significant bits that are
25 fixed, that allows me to assign those most significant bits to

1 an encoder that I could have on the floor for hand encoding,
2 which I believe was specifically where he was working, that was
3 the problem he was on at that time. So a mobile encoder, how do
4 I be able to allow this mobile encoder to operate not just with,
5 you know, one particular set of GTIN numbers and add a serial
6 number, but how could I allow it to work across GTIN numbers so
7 I can have it work with multiple products and maintain
8 uniqueness across multiple products.

9 So by having a fixed number of most significant bits
10 with a fixed value, and that value can differ for different
11 encoders, that would allow him to work independently as well as
12 maintain that uniqueness across those numbers.

13 Also, if you wanted to have that encoder encode, you
14 know, 64-bit EPCs and 96-bit EPCs and 198-bit EPCs -- we haven't
15 talked about those, but they exist too -- you could have that
16 same set of most significant bits, and you would be able to
17 maintain uniqueness of the number, but effectively, the serial
18 number that you assign is dependent upon the number of bits you
19 have in the serial number when you end up encoding it into the
20 RFID tag.

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Q. And we talked about it a little bit generally kind of at the top of our discussion today. Why are bit boundaries important in terms of claim 1 of the '967 patent and Mr. McAllister's invention?

A. Bit boundaries are important, again, because Mr. McAllister's invention is focused on the most significant bits. That is, he has a very specific definition of I'm looking at bit boundaries, as I'm looking at the structure of how data is stored in the tag, as opposed to what's human, easily read and understandable, so I'm not counting by tens, I'm counting by twos, and I'm looking at the most significant bits.

1 By allocating from the most significant bits, that
2 allows all of these other, you know, referred to as lesser
3 significant bits, that's where they all will be changing values
4 as you increment them going up, but they all have the same value
5 for the most significant bits.

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Q. Does Mr. McAllister's invention, as we briefly

1 discussed it in the claim language, help solve that real world
2 problem that still existed in 2008?

3 A. It does.

4 Q. And how so?

5 A. Again, because you can take those most significant
6 bits -- you've created a block with a fixed number of most
7 significant bits. You can assign those most significant bits to
8 a particular encoder, as he describes in the patent, and then
9 that encoder now has a range of numbers and you can make the
10 most significant bits, you know, a lot of them or a few of them,
11 like eight, to give it trillions of numbers that it can encode.
12 It can then operate continuously throughout -- throughout the
13 lifetime without ever having to communicate back into the master
14 network.

15 And whenever those numbers are seen out in the network
16 somewhere, that is an RFID tag is read with those numbers, if
17 you go back to the bit level, you can identify which encoder was
18 actually using it and that encoder would be able to operate at
19 multiple different -- so at 64-bit, 96, and 198 bits, all
20 simultaneously with just that same number of and same value for
21 most significant bits.

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C E R T I F I C A T E

I certify, by signing below, that the foregoing is a true and correct transcript of the record, taken by stenographic means, of the proceedings in the above-titled cause. A transcript without an original signature, conformed signature, or digitally signed signature is not certified.

DATED this 17th day of July, 2023.

// Ryan White

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