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UNITED STATES FEDERAL TRADE COMMISSION
Washington, D.C.

RADIO FREQUENCY IDENTIFICATION:
Applications and Implications for Consumers
An FTC Workshop

June 21, 2004
8:30 a.m. to 5:30 p.m.

Federal Trade Commission Conference Center
601 New Jersey Avenue, N.W.
Washington D.C.

Reported by: Karen Guy and Susanne Bergling, RMR
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ChallengeVisBest Practices ande

1 P R O C E E D I N G S

2 - - - - -

3 MS. BROF: Hello. I'm Julie Brof with the
4 Federal Trade Commission's Northwest Regional Office.
5 I've spoken to a number of you, and welcome to the FTC.

6 Before we start today's proceedings, I have some
7 important logistical and safety information to share
8 with you. We're very low-tech here, so if you leave the
9 building at any time, you'll be rescreened through
10 security to re-enter, so make sure you bring some form
11 of identification with you when you leave the building,
12 and keep your IDs or your name tags on when you're in
13 the building.

14 Please turn off all cell phones or pagers or set
15 them to vibrate during the workshop, and fire exits are
16 through the main doors at the front of the building or
17 on New Jersey Avenue and through the pantry area, which
18 is right behind here through a corridor to G Street, and
19 in the event of an emergency or drill, please proceed to
20 the Union Labor Life Building directly across
21 Massachusetts Avenue, but don't follow me, I'm not
22 sure -- oh, that way (indicating).

23 The bathrooms, very important, are located
24 across the lobby, and there are signs right outside the
25 conference area to direct you. Also very important, if

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1 marketplace.

2 In the supply chain, it's transforming the
3 track-and-trace process. At the same time, it's making
4 transportation, health care and the food supply more
5 efficient and safer.

6 We've got a great day planned. We're going to
7 learn about the range of RFID applications from both
8 developers and users in both the private and public
9 sectors. We'll also be hearing from folks who are
10 looking at the impact of these applications on
11 consumers' lives, the benefits, like efficiency, product
12 safety and access to information, and the potential
13 drawbacks that may compromise the privacy and security
14 of consumer data.

15 We'll be hearing from some experts with views on
16 what the future will bring, and then we'll close the day
17 with some suggestions on how to address concerns about
18 RFID use.

19 This workshop is the latest in a series that was
20 designed to help us educate ourselves and the public on
21 emerging consumer protection issues. I want to thank
22 our panelists who have traveled from near and far to
23 help us do that.

24 I'd also like to thank those of you in the
25 audience and ask that you participate. Your questions

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1 and comments can help inform the discussion.

2 I also want to thank VeriSign, RSA Labs and
3 Texas Instruments for providing examples of RFID
4 technology and applications in action. During the
5 breaks, please take a look at these exhibits that are
6 out here at gallery which we are referring to as the
7 "Petting Zoo." We have great names for our IT projects
8 here. We have a refrigerator to hold spam, we have a
9 jet plane that matches numbers telemarketers called with
10 the Do-Not-Call List, and now we have a petting zoo.

11 I'd also like to say how pleased I am to see how
12 many industry members who are here today who are taking
13 the initiative to address consumer privacy concerns and
14 incorporate these considerations into the design and
15 deployment of RFID.

16 Consumer privacy is a critical issue for the FTC
17 and across the Federal Government, which is also well
18 represented here today, and for the business community.
19 The efforts to address consumer privacy take a variety
20 of forms, and that's as it should be.

21 The wide range of uses for RFID makes a
22 one-size-fits-all solution unlikely, but the common
23 objective should be transparency. There could not be a
24 clearer need for transparency than when a new technology
25 is deployed in new and different ways.

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1 to learning about RFID, but I'm also interested in
2 what's in store for me as a consumer, and we hope
3 today's workshop will provide a basis for everyone to
4 continue their efforts to advance this technology in a
5 responsible manner and inspire more.

6 Before I turn it over to Julie for the first
7 panel, let me take a moment to thank her for her hard
8 work in organizing this workshop. Julie, along with
9 Tracy Thorleifson and Chuck Harwood, all of our
10 Northwest Regional Office in Seattle, have put together
11 a great program. Again, we're very glad to see you
12 here, and take it away, Julie.

13 PANEL 1

14 MS. BROF: Thank you. Hello again. With the
15 help of our distinguished presenters to my left, this
16 panel will explain, as the title states, the ABCs of
17 RFID. Some of the questions we'll address are really
18 the basics. How does radio frequency identification
19 technology work? What kinds of systems are properly
20 defined as RFID, and what are its parameters? And how
21 does RFID differ from other technologies that serve
22 related or similar functions?

23 Before we launch into the discussion, I'd like
24 to introduce the experts sitting beside me who will be
25 the ones actually answering these questions. First

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1 we'll hear from Sue Hutchinson, who is a product manager
2 with EPCglobal U.S. EPCglobal, as most of you know, is
3 the joint venture of the Uniform Code Council and EAN
4 international. EPCglobal's mission is to establish and
5 support an internationally recognized standard for
6 realtime automatic identification of any item in the
7 supply chain of any company anywhere in the world.

8 As product manager for the EPCglobal U.S.
9 Division, Ms. Hutchinson is responsible for the Solution
10 Partner Program and for building subscriber services for
11 the many hardware and software companies joining
12 EPCglobal. Sue will give us an overview of RFID,
13 including a video showing how consumers are interactncil and EAN
m4 with Eelectronic iroduct mcde s Suh will galso discus
15 the maplycation sof thes toechonology whoichwill grodideoTjT†

1 explore new applications of RFID technology. In his
2 presentation, Dr. Engels will provide some important
3 background on the evolution of RFID. He will also
4 explain some facets of how it functions and how it
5 differs from competing technologies.

6 Finally, we'll hear from Manuel Albers, the
7 Regional Director of Business Development for
8 Identification Products in the Americas at Philips
9 Semiconductors. Philips Semiconductor is a global
10 leader in the design and manufacture of chips used in
11 RFID tags, and they have shipped more than 1 billion
12 such chips to date. Philips' RFID-based technology is
13 used across a diverse set of applications, such as
14 supply chain management, transportation and security,
15 all applications we'll hear more in-depth about today.

16 Manuel is a native of Hamburg, Germany, and has
17 ten years of experience with smart card and RFID
18 technology. Manuel's presentation will further explore
19 how RFID is touching our lives already, which like Sue's
20 presentation is a good preview of what will be addressed
21 in greater detail as the day proceeds.

22 After we hear from our experts and discuss some
23 follow-up questions I have, we'll have time for some
24 questions from the audience, and this goes for the rest
25 of today's panels as well. Each of you has some index

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1 cards in your packet. Throughout the panel, if you have
2 a question, you can write it down, pass it to the
3 closest end of your row, raise your hand like you're in
4 school, and one of the FTC staff members will pick it up
5 and give the card to me. So, if you need additional
6 cards, you only have two right now, there are some where
7 you checked in.

8 So, without further adieu, let's begin.

9 MS. HUTCHINSON: Good morning, ladies and
10 gentlemen. I'm Sue Hutchinson from EPCglobal. We are a
11 neutral, not-for-profit standards body that's working on
12 technical standards for RFID and the information systems
13 that support RFID. As part of my role at EPCglobal, I
14 have the pleasure of working with a broad array of
15 manufacturers, distribution partners, retailers,
16 logistics people, hardware companies, software companies
17 and integration partners throughout the world, all
18 interested in driving towards a single set of technical
19 standards for RFID and the information systems that
20 support them.

21 So, you ask yourself, what is it about RFID that
22 is so interesting to so many businesses around the globe
23 that we're able to come together in such a cooperative
24 fashion? I thought I would start this morning with a
25 brief videotape to kind of give you a feel for what's

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1 exciting the supply chain about RFID.

2 (Videotape played for the workshop
3 participants.)

4 MS. HUTCHINSON: Great. So, as the video
5 pointed out, what we're here to talk about when we talk
6 about RFID fundamentally is visibility and increasing
7 the visibility within the supply chain around the globe.
8 Now, with increased visibility, we look at two primary
9 benefits. One is efficiency. If I can see where
10 products are moving around the supply chain, I can be
11 more efficient in the way that I move them, enhancing
12 the ability for those products to make their way onto
13 the shelf for consumers in a more rapid fashion.

14 More importantly, if I get better visibility in
15 the supply chain, it helps me know where things are
16 going and how fast it takes to get there. I can
17 decrease the amount of safety stock or excess inventory
18 that I hold "just in case" at various points in the
19 supply chain. I can be a lot more efficient with the
20 way that manufactured goods move from the manufacturer
21 through distribution out to the final retailer and
22 ultimately to the consumer.

23 The other thing that visibility gives me is
24 assurance, not only assurance of where those products
25 went, but they are, in fact, the products that I meant

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1 to send through the supply chain.

2 Let me finish this morning with a brief analogy,
3 my tale of two pens. Now, pen number one I find out was
4 manufactured here in the United States, and it went to a
5 wholesaler, went into the distribution system of my
6 local Staples, made it into the back room of Staples and
7 then finally onto the shelf.

8 Pen number two was manufactured in Mexico. It
9 was shipped to Canada where it was private-labeled by
10 another manufacturer, made its way to that same
11 distribution center and ultimately into the back room of
12 my local Staples store.

13 Now, these are pens, so ultimately I don't care.
14 I was just happy that they made it to Staples and I was
15 able to pick up a box of them when I was running out.

16 If instead of pens we were talking about
17 electronic components going into a computer system or a
18 navigation system for an airliner or we were talking
19 about prescription drugs or beef or even green onions,
20 the ability to know the source of where those things
21 came from, where they went and how they got to me as a
22 consumer has a lot more importance than it did with just
23 my two simple pens from Staples.

24 So, that's what we're going to hear during the
25 course of the day from the rest of our panel of

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1 here, there's realities -- thank you very much -- there
2 are realities with the technology of RFID. For those of
3 you that have stood in line at a checkout counter and
4 watched bar codes get scanned and scanned and scanned
5 over and over again before the checkout person types in

1 put it in the ignition, and that's actually part of your

1 read them.

2 Now, advanced RFID technologies, more expensive
3 technologies, can have on-tag memory. This is great for
4 storing mission-critical information or caches of
5 information. They have more functionality and they have
6 algorithms on the chip itself, maybe on collecting data,
7 maybe on-board sensors. It's really depending upon how
8 much you want to spend, how much money you want to put
9 into it, how much functionality you want to design into
10 it.

11 At the high end of RFID, you'll get -- and like
12 I say, this is really what a cell phone is. A cell
13 phone has RF communication. You've got your antennas.
14 It's got an identifier on it, in fact, a unique
15 identifier -- most cell phones today have unique
16 identifiers, and it's got additional functionality. You
17 can actually do voice over the network, and it has a
18 built infrastructure, et cetera. It's a perfect
19 analogy. It really is an RFID device.

20 Now, because you've got this range of potential
21 functionality, RFID devices are typically classified as
22 passive, semi-passive or active. This is really
23 referring to A, where do they get their power source,
24 and B, how do they communicate.

25 Passive tags are the cheapest. They have no

1 on-tag power source, no battery, et cetera. They
2 harvest energy from the reader's communication field.
3 They typically do not have significant amounts of
4 functionality. That is, on-board sensors typically are
5 not part of the passive device, because it's only
6 operating when the tag has power, that is, when it's in
7 the reader field.

8 Semi-passive still communicate passively, so it
9 is not actively sending out a communication signal like
10 a cell phone, but they have an on-board power source
11 that goes into one sensor, so they can keep a
12 temperature history, run algorithms, has more
13 functionality. This is very crucial when you're talking
14 about the history of a device, particularly when it's
15 out of communication range with a reader, very important
16 in the cold chains, pharmaceuticals, et cetera.

17 Then, of course, active communication. Active
18 is basically like a cell phone. You actively send out
19 information. You can communicate with one another, and
20 in the extreme, this may even be tag-to-tag
21 communication. This is your ad hoc sensor networks type
22 of functionality. Really this is the gamut of
23 functionality. And RFID is a very about th, wmod hswah on

1 frequencies, around 900 megahertz, for example. Again,
2 great for long-range communication for passive systems
3 but has limitations, of course. And there are other
4 frequencies around the world where you may be able to
5 use active communication, but power is such that you're
6 not going to be use passive communications at those
7 frequencies.

8 We're talking a lot about passive RFID systems,
9 because that is the system that is going to be used in
10 very, very short order in retailers and is being adopted
11 by retailers around the world. When we talk about a
12 passive system, there are basically three components.
13 The tag, which is what you put on the object to be
14 identified; the readers, which is what you use to
15 communicate with those tags to gather information;
16 typically the object identifier, so the reader knows
17 where it is and the time it read it; and then you have
18 the applications systems, which take that information
19 and do something intelligent and useful with it.

20 Now, the tags themselves just have, you know, at
21 the lowest cost, again, just have an RF interface,
22 that's the communication, some sort of control for the
23 communication, and maybe an application subsystem, that
24 is, maybe an anti-collision algorithm. The readers have
25 the interface communication control, application

1 tag, the tags being initially adopted, we're just
2 talking about tags that have an object identifier. So,
3 the data that they're communicating back is just tag
4 identity or object identity, very limited amount of
5 information on them.

6 And since UHF is the top of the discussion for
7 today primarily, because that's what's being widely
8 deployed, let's look at it a little bit closer. Some of
9 the advantages of using the 900 megahertz frequency
10 spectrum is it really is the best available frequency
11 range because of regulations for communication or
12 identification of objects greater than one meter away.

13 When you think about supply chains, back rooms,
14 warehouses, DCs, pretty much you're at least a meter
15 away wherever you are. It's very effective around
16 metals or can be made very effective around metals, but
17 again, requires good system design to work. If you put
18 the tags right next to the metal without designing the
19 system properly, you are not going to read it at all.
20 So, you have to use very good system design to make it
21 work around metals.

22 The range, again, is limited by power
23 regulations. In the U.S., you can get up to about ten
24 meters. One of the best systems on the market, best
25 case scenarios today, are ten meters. This is no

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1 obstructions, wind blowing the right direction, no RF
2 interference in any way, have very clean environment,
3 ten meters is about the best you're going to get.

4 Practically, this means that you're going to get
5 about three to five meters in a normal operating
6 environment. You can get more, you can get less. It
7 really depends on the tag design, the reader design and
8 the interference of the system and the environment.

9 It's really good for non-line of sight
10 communication. That is, you can read it through
11 obstructions. You can read it through cardboard. You
12 can read it through most objects, which makes it very,
13 very good for identifying all the cases on a pallet,
14 particularly as they're going through a back door or as
15 they're coming down a conveyor belt.

16 It has a high identification rate, which makes
17 it very good for reading tags in a high-density
18 environment, moving through, again, cases on a pallet,
19 where every case is tagged. And you can actually
20 reasonably control the read zones. That is, if I want
21 to read around a dock door, I can usually control the
22 dock door environment.

23 Some of the major disadvantages of UHF
24 communication is that it's absorbed by water. That is,
25 if you want to communicate with tags that are located

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1 around cola or water or other liquids, if you've got the
2 tag down near the liquid, you better be looking directly
3 at the tag; otherwise, you are not going to read through
4 that obstruction. That is, the water is going to absorb
5 the energy.

6 So, if you want to steal these tags, really what
7 you need to do is take them and put them in your armpit
8 and walk out the door. The reader is not going to be
9 able to read it, you know, a human is 90 percent water,
10 so it's a beautiful way to obstruct tags. That's by its
11 system design, if you rely upon the EAS systems just to
12 do that, though. No offense, Stan.

13 Now, while you can reasonably control the read
14 zones, it's also difficult to control. That is, if I'm
15 trying to read a passive tag going through a dock door,
16 while I can design the system to work around metal,
17 metal is also a beautiful reflector of this energy. I
18 can take this tag that I've got ten meters away, sitting
19 not even close to the dock door, and just because I've
20 got, you know, somebody's belt buckle -- they've got a
21 nice beautiful belt buckle, they walk by the reader
22 environment, I can get a beautiful bounce and I can read
23 this tag. It's a very unusual thing, that you can get
24 stray reads with UHF technology. So, I can control the
25 reading environment reasonably well. I also get some

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1 spurious reads because of the nature of the technology,
2 the nature of the communication.

3 Now, for the EPC identity tag, some of the key
4 features of the identity tag features developed by
5 EPCglobal and the Auto-ID Center, it's being adopted by
6 corporations such as Wal-Mart, Albertson's, Target,
7 where really the major retailers are driving its use
8 within the supply chain.

9 The EPC identification tag has an EPC identifier
10 only as its data content. That is, it's got an object
11 identifier on it so I know what item I have, down to the
12 inches level on an EPC, and purportedly for consumers,
13 I've got a kill functionality. So, when I buy that tag,
14 buy that object, I can have it killed electronically. I
15 don't have to find the tag and rip it apart. I can just
16 issue a kill command, and it will basically commit
17 suicide. A little puff of smoke comes out -- I'm sorry,
18 not the puff of smoke.

19 Now, for retailers, initially it's not going to
20 be a worry, because these are not going into consumers'
21 hands, but it is there, a feature that's been put in
22 specifically to alert them, so that if you don't want
23 these passive, promiscuous tags on your body, you just
24 kill them, and that feature was designed directly into
25 the EPC protocol specifically for that consideration.

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1 So, a quick summary now that I've bored you with
2 some nice technical detail. RFID technology really does
3 have a long history. It's been in use for more than 30
4 years commercially in many applications. It has touched
5 your life whether you realize it or not. The systems
6 have great performance in some regions, not so great
7 performance in others. It's really the regulatory
8 requirements and limitations that determine the
9 performance of these systems.

10 Passive tags, again, harvest energy from a
11 reader communication signal. This is very important,
12 because it means that it's really a not particularly
13 reliable communication medium. Many obstructions, many
14 variabilities in the environment can cause you not to be
15 able to read a tag.

16 Again, the 900 megahertz passive tags being
17 required for many retailers are in, best case scenario,
18 less than ten meter read range, and they can be shielded
19 by metals and by liquids.

20 Thank you.

21 MR. ALBERS: So, good morning. My name is
22 Manuel Albers. I'm with Philips Semiconductor, and
23 Philips is one of the leading manufacturers for those ID
24 chips that Dr. Engels just referred to. I should
25 probably show you one slide that we have.

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1 Philips Semiconductors is a division of Royal
2 Philips Electronics, one of the leading electronics
3 companies in the world. I think it's about number three
4 in the world, and is one of the top ten semiconductor
5 manufacturers worldwide, and when it comes to
6 identification technologies, we are one of the market
7 leaders here with a track record of about 1 billion
8 identification chips supplied into the market to date,
9 so that's with respect to Dr. Engels' point of the
10 technology is already out there around us, and I will
11 now share with you where we already see this kind of
12 identification technologies today and what kind of
13 features make up these different types of identification
14 technologies.

15 In general, when we talk about identification
16 technologies, we are talking either about people who we
17 connect through the means of identification technologies
18 to services or we're talking about objects or goods that
19 we identify and track through the means of
20 identification technologies.

21 When we look at these two types or two classes
22 of identification technologies, in the first place, for
23 the people, we are talking typically about the type of
24 smart cards. So, it's a feature that we are already
25 pretty much familiar with here in Washington, D.C.,

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1 where you use it for the public transportation, it's a
2 smart card form factor, but it can also come in a smart
3 token that you present to a smart com, for example,
4 either for, you know, for the payment of your gas
5 purchase or as a means of a loyalty system to collect
6 points. So, these form factors are being used to
7 identify people and to grant them access to services.

8 On the other hand, we talk about RFID, and RFID
9 is all about identification and tracking of objects.
10 These technologies have a purpose and have feature sets.

11 When we're talking about smart card technology,
12 you typically then talk about a contact with a smart
13 form factor or it can also be a token that can be easily
14 inserted into a cell phone. You have -- what you find
15 or what the goal is here is a combination of security
16 and convenience, so that you have a secure means to
17 access services, but at the same time, also make it
18 convenient for you, so that you can, for example, even
19 leave -- you can put the smart card in your purse or in
20 your wallet, and you present it to a reader when
21 entering the subway.

22 Typically, you find operating distance for these
23 kind of contactless smart cards of about three to four
24 inches or ten centimeters. What is important here is
25 that when you identify people or when people access the

1 services is whether they're secure, and in order to make
2 it secure, you're talking about different features and
3 different functionalities.

4 So, for example, first of all, when you present
5 the card to a reader, you want to make sure before the
6 communication happens in between the reader and the card
7 that both are allowed to talk to each other, so you have
8 a mutual authentication. So, you really have to make
9 sure, yes, I am allowed to talk to this reader, and the
10 reader has access to this card, which means he needs
11 keys for this.

12 What you are also going to encounter are
13 encryption schemes. So, once both the card and the
14 reader have authenticated themselves to each other, they
15 talk in an encrypted way, so that somebody who stands
16 next to it and wants to listen in, they can capture the
17 communication, but they cannot understand it, because
18 it's encrypted.

19 Another means for protection is a password, to
20 also make sure that you as a cardholder are also the one
21 who's authorized to get access to the data on the card.
22 So, you will have, for example, on the one hand, you
23 need to hold the card, and on the other hand, you need
24 to pass it in order to access memory in the card when
25 you present it to a reader.

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1 And lastly, what you also see are those design
 2 features on the chip itself, so you make it very hard
 3 for people to try to break into that IC and to try to
 4 steal information out of the chip. So, you will have
 5 countermeasures on the chip level itself when you design
 6 and manufacture the chip that makes it very secure.

7 All of these features, however, also have a
 8 consequence. They typically drive the cost of such an
 9 IC. So, that's why you typically see the other costs of
 10 a smart card or of a smart token more in the range of
 11 more than a dollar and all the way up to \$20-plus,
 12 depending on all the design features that you may

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1 D.C., but also San Francisco, San Diego, Los Angeles,
2 Boston, Atlanta and many other cities, including Las
3 Vegas, are now going this way. So, this market today is
4 worth about 500 million cards already.

5 Then you have payment applications, and you
6 might have -- we have already seen announcements from
7 both MasterCard, Visa and also AmEx to provide you with
8 a contactless smart card that allows you to pay just by
9 waving your smart card over a reader, for example, at a
10 quick service restaurant, or in the future probably at
11 the Starbucks, at the pump, and then that's where speed
12 actually is important.

13 Another large area is access control, so a
14 card -- you could be holding it in your wallet in order
15 to access your office or something in the morning, and
16 in a similar way, Dr. Engels also referred to cards for
17 authorization. This market is probably also worth about
18 300 to 400 million transponders today to the various
19 callup manufacturers and respectively to the car
20 manufacturers that allow you to securely access your
21 car, with not only the mechanical lock but also there's
22 an electronic lock that requires a transponder when you
23 slide in your car key.

24 Then the next step, you are going to get rid of
25 your car key entirely. You will just merely contact the

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1 smart card that you either carry in your purse or your
2 pocket, and when you approach the car, it opens already
3 the door for you, and because it realizes it is you, it
4 also adjusts the seats for you, adjusts radio stations,
5 and if you approach your car from the rear end, it opens
6 the trunk for you, depending on how you have set the
7 features.

8 And lastly, and this is probably the most
9 ubiquitous application that we are going to see for
10 contactless smart card technology, are our passports, so
11 the U.S. Government personnel require and all other
12 countries to deploy smart visas, also passports, that
13 are able to hold your credentials, like your fingerprint
14 or picture of the passport holder on a chip inside the
15 passport, and when you come to the border entry, you
16 present it also to a reader, just like your contactless
17 smart card, and the officer is going to be able compare
18 your face with the picture that is stored on the chip
19 inside the passport. So, that is the people side of
20 contactless identification technologies.

21 Now, when we look at the object side or the
22 goods side, we really look at the RFID technology. It
23 has a different focus. On the RFID technology side, we
24 are typically talking about a smart label form factor,
25 and to use one example on the picture that we see here,

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1 it can also have various other shapes and form factors.

2 Typically compared to the secure identification
3 smart card technology, here you're talking about the
4 functionality that Ms. Hutchinson earlier referred to as
5 license plate information. So, really it's typically
6 just a number that allows you to securely identify a
7 specific good or product.

8 In addition to that, you can find additional
9 memory residing in the chip that allows you to store
10 more information about the product inside the chip. For
11 example, before a manufacturer ships his product to a
12 Wal-Mart, he wants to probably also make use of that
13 RFID label going through his own supply chain, and for
14 example, use that memory as a checklist when it runs
15 through his own production, and at the end of the day,
16 he will see that information again before he ships it
17 out to Wal-Mart or to another retailer In addi ltkiesab

1 chip, or a very basic encryption scheme. Also on these
2 IC features is a destroy feature or kill switch, as has
3 been referred to, that destroys all of the functionality
4 of the smart label.

5 The reading distance is medium to long, so about
6 20 feet, and as Dr. Engels referred to, you can also get
7 up to 30 feet, but this is really under optimum
8 conditions. And again, it's typically for very low cost
9 applications, and the price ranges right now are for
10 RFID tags coming down from \$2, all the way down to what
11 is required today for the retail environment, closer to
12 5 cents or a couple of cents.

13 Applications that you see out there today range
14 typically from supply chain management and the various
15 kinds of supply chain management, being manufacturing
16 automation, warehouse automation, processing services,
17 baggage checking in airport, which is now becoming more
18 and more popular and efficient, and on the other hand,
19 you have asset management.

20 Most normally it's library automation, where you
21 have self check-in and check-out terminals with books
22 that you can take out of the library, but at the same
23 time, you can also do automatic inventory control at
24 libraries and identify books and those that have been
25 misplaced just by hitting a switch or also by walking by

1 a shelf with books with a reader that allows you to
2 identify the book that is placed in the wrong space.

3 If you have any questions, please also feel free
4 to contact me by email. You will find my email address
5 here in the slides, and I believe these slides are going
6 to be posted on the Web, right?

7 MS. BROF: Yes.

8 MR. ALBERS: Okay, thanks very much.

9 MS. BROF: Thank you. We just have a couple of
10 questions.

11 When you're talking about read/write capacity,
12 does that relate to the memory function on a tag, and
13 how does that work?

14 DR. ENGELS: With regards to the read/write
15 capacity, that really is dependent upon how much memory
16 is actually on the tag. When you write to silicon, you
17 can, again, use the RF interface for it, and the read
18 range is typically significantly reduced for the write
19 functionality, because it requires more power to
20 actually write to most memory technologies in use today.

21 Reading is simply trying to read out
22 functionality or read out the memory contents, and when
23 you think about how much memory is actually there,
24 again, it's variable. Many technologies on the market
25 today have sort of kilobytes or more of memory. The EPC

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1 identity tag has just enough memory to store an object
2 identifier and an error detection code, typically on the
3 order of less than 128 bits of information.

4 MS. BROF: And when you talk about the
5 information that can be accessed from a tag and we're
6 talking about literally like a number or an
7 identification number, but the meaning of that
8 information only comes really when it's then linked to a
9 database with additional information, and how does -- if
10 the database is needed, what kinds of protections are in
11 place to limit access to it?

12 And if you're operating under a system where any
13 reader can read any tag, with then the next step being
14 getting meaning behind what information is on the tag,
15 how does that work or what kinds of protections exist?

16 MS. HUTCHINSON: We've been using the analogy
17 this morning of that simple identifier on the RFID tag
18 being like a license plate number. Well, if you have a
19 license plate number, you have to have a Department of
20 Motor Vehicles somewhere to provide the context for what
21 that number means, and this is literally the mechanism
22 that we use in the EPCglobal network. So, that small
23 identifier, that 96 bits of information that is held on
24 an EPC tag, is our key to a naming service that's called
25 the object naming service, works very much the way that

1 your internet browser works today with the domain naming
2 service, to translate a URL into a location somewhere on
3 the internet to be able to find the information, the
4 same thing is true with the object naming service. I
5 can go from that simple license plate number to a
6 location.

7 So, for example, if I have a product that came
8 from Procter & Gamble, as that tag is scanned, part of
9 the number that's on that tag may come up with the
10 number 0037000, which I can send to ONS, and it says,
11 oh, the information that you're looking for, you're
12 seeking, is in a server within the Procter & Gamble
13 network. So, we're talking about a server that is
14 behind the firewall at Procter & Gamble and very well
15 secured, because we're talking about some fundamentally
16 very sensitive business information.

17 By being part of the EPCglobal network, I get my
18 authorization and my digital certificate to be able to
19 then go as a retailer or another supplier or someone in
20 logistics, to be able to go to that network and ask for
21 more information about that number that I just read off
22 the tag. So, most importantly, the information is not
23 on the tag. It is secured behind the firewalls of
24 corporations, logistics providers and retailers all
25 around the globe.

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1 MS. BROF: And now I have a couple of questions
2 about the kill function, first just basically explaining
3 how that works and who has the authority to kind of
4 exercise that kill function or who I guess issues the
5 command, then sort of two sides of the same coin, can it
6 be re-activated, you know, kind of re-awakened, and
7 then, would it be easy for someone to issue the command
8 and destroy all the information, you know, or the
9 ability to get information that would be useful, but
10 maybe you shouldn't be able to do that.

11 DR. ENGELS: So, the kill functionality is a
12 passport-protected command, so the reader can actually
13 issue the kill command in normal command functionality
14 mode, but a specific password is required of it as well.
15 That password in the next generation will be 32 bits in
16 length, and effectively that means it will take you
17 several hours to guess the correct password to be able
18 to kill a particular tag.

19 Dead does mean dead. Actually, I had a long
20 conversation this morning about zombies and other
21 ghostly features and characteristics of RFID tags, but
22 no. Dead means dead forever and forever. Once a tag
23 has been killed, if it is compliant with the EPC spec,
24 it will never modulate back. So, it will never
25 communicate ever again forever, never. So, the tag

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1 information will never be modulated again by the tag;
2 that is, it will never be able to communicate any
3 information.

4 One functionality that has been talked about is
5 that you can even erase the information as well if you
6 have a like memory technology, is when you kill
7 yourself, you kill the tag, you use the correct
8 password, and then the tag erases all of its memory
9 contents, so that even a forensic electron beam analysis
10 of the tag will never receive what number was actually
11 stored on it and that it committed suicide as well.

12 Now, who actually has the authority to issue
13 kill commands? The answer is the owner of the tag. So,
14 if you own the tag, you have the authority to kill the
15 tag any way you want to, physically or electronically.
16 If you do not own the tag, you definitely do not have

1 pins that they would use to exercise it?

2 DR. ENGELS: If you as a consumer own a tag, you
3 have the authority to kill that tag, and when you
4 purchase it from somebody, you should either have them
5 kill it for you if you want it as such or they should
6 have transferred to you the correct password so that you
7 can kill the tag yourself at some later date.

8 I believe most stated retailer plans with
9 regards to kill functionality is that the retailers,
10 when they sell an item that has a tag on it, will kill
11 the tag at point of sale before it ever leaves the
12 building.

13 MS. BROF: And the last question, changing
14 topics, what's the status of the EPCglobal standard
15 specification?

16 MS. HUTCHINSON: Sure, the Version 1 of all the
17 specifications for the communication between the tag and
18 reader as well as some common data elements and common
19 communication techniques for those information systems
20 that we talked about were modified by the EPCglobal
21 Board of Governors last November, and there are
22 currently more than 20 vendors worldwide that are
23 already selling tags and readers to those
24 specifications.

25 This is a technology in its infancy, though, and

1 as we deploy the technology, as we learn more in
2 implementation, we continue to revise those standards to
3 address what we're finding in our early implementations,
4 things like consumer concerns about privacy. So, we're
5 actively working on a second generation of all of those
6 standards, the first of which is due out later this
7 summer. We're probably looking at a second revision for
8 all of the standards related to the network before the
9 end of this calendar year.

10 MS. BROF: Well, thank you very much. That was
11 a good grounding, I think, for the rest of today, and we
12 have about ten minutes now before our second even longer
13 panel, so if you want to take a coffee break, we'll
14 reconvene at 9:45. Thank you very much.

15 (Applause.)

16 (A brief recess was taken.)

17 PANEL 2

18 MR. HARWOOD: Good morning. My name is Chuck
19 Harwood. I'm the director of the Federal Trade
20 Commission office in Seattle, and I'm pleased to be here
21 today to greet all of you.

22 This is our second panel of the day. It's on
23 current and anticipated uses for RF technology. For
24 this panel, after we finish this panel, you'll have a
25 sense of the breadth and scope of RF technology

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1 applications or implementation, both currently and in
2 the near future.

3 We have a distinguished panel who will be
4 speaking with us today. I'm joined first of all by my
5 co-moderator, who is Lyle Ginsburg -- right, thank you,
6 trying to find my notes and talk at the same time, and I
7 don't read and talk well at the same time apparently --
8 and Lyle is the managing partner for Technology
9 Innovation in Accenture's Global Product Operations
10 Group. He was Accenture's board member at the Auto-ID
11 Center, now represents the company to EPCglobal. As I
12 said, he is the co-moderator, and he will be asking some
13 of the questions today.

14 In addition to Lyle, on the panel we have Britt
15 Wood. Britt is a Senior Vice President of Industry
16 Relations for the Retail Industry Leaders Association,
17 a/k/a RILA, R I L A. He's been with RILA since 1995,
18 and he also serves as RILA's main representative on
19 several external industry-related committees, including
20 the EPC Alliance for the last four years.

21 The third speaker or the second speaker,
22 actually, on the panel, is Simon Langford. Simon is the
23 Manager of RFID Strategy for Wal-Mart Stores, Inc.
24 Simon is responsible for the integration of EPC into
25 Wal-Mart systems.

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1 The third panelist is Bill Allen. Bill is the
2 Marketing Communications Manager for Texas Instruments
3 (TI) RFID Systems. In this position, he's responsible
4 for the marketing communication strategy and managing
5 TI RFID's public relations advertising and trade show
6 involvement.

7 The fourth speaker is Ken Fishkin, who's on the
8 other side of the -- well, he's down there, okay. Ken
9 Fishkin, he's a researcher at Intel Research in Seattle
10 and an Affiliate Professor of Computer Science at the
11 University of Washington. He has 15 years of experience
12 in industrial R&D.

13 The fifth speaker is Paul Rudolf. Paul became
14 Senior Adviser For Medical and Health Policy in the
15 Office of Policy at the Food and Drug Administration in
16 July 2003. He was a member of the FDA's Counterfeit
17 Drug Task Force.

18 The sixth speaker is Lee Tien. Lee is a senior
19 attorney with the Electronic Frontier Foundation in San
20 Francisco, California, specializing in free speech and
21 privacy.

22 And our final panelist member is Peter Sand.
23 Peter serves as the Director of Privacy Technology in
24 the Privacy Office of the U.S. Department of Homeland
25 Security.

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1

They will be speaking in the order I've

1 given its relative infancy, certainly in the way it's
2 been talked about being deployed today.

3 So, you still get tags that get shipped to
4 buyers that don't all work, or after they're applied
5 don't work, or the performance isn't as fast as we want,
6 the read rates aren't as high as we'd like, and we can't
7 read all the things that we want to today.

8 The cost is still too high, you know, the lowest
9 published cost that I've heard about for some of these
10 tags, if you buy a million of them, is 19 cents apiece.
11 If you talk to some of these companies about purchasing
12 consortiums to drive the numbers up into the hundreds of
13 millions, you start to be able to talk about things like
14 7, 8, 9 cents apiece, but still for many companies, that
15 business case still doesn't work. We talk about even 5
16 cent tags for cases, pennies or less for individual
17 items. So, we have a ways to go on the costs.

18 Dan talked about UHF frequencies and HF
19 frequencies and how some frequencies work better at
20 distances, some work better close up, and so we have to
21 figure out if we want to start tagging individual items,
22 which frequency are we going to use, so we can track
23 something all the way through the supply chain.

24 If that's not enough, China threatens to invent
25 its own system, and if that's not enough, you look up

1 RFID on your Google, and you get spy chips and so on.
2 So, what would any logical person conclude? Well, all
3 systems go, of course. On with the show.

4 It's kind of funny, right, that those aren't the
5 realities of today. Those aren't the relevant facts,
6 yet we are moving forward. Why is that? Well, there's
7 a pretty astounding panel that took place a couple of
8 weeks ago at ECR Brussels where the CEOs of Wal-Mart,
9 Metro, Unilever, Nestle, a few others, all talking about
10 RFID, and I'm amazed that at that level they can spell
11 RFID let alone have an in-depth conversation, which they
12 did. They were all very knowledgeable on the subject,
13 and their message was pretty loud and clear.

14 You know, we did invest in the bar code years
15 ago. It was painful when we first got started, but we
16 had to start to get to where we are today, and that was
17 really the message of where we are with RFID. So, I
18 think that sort of provides some context around why we
19 are doing this given the realities of where we are.
20 We're at the beginning of a marathon. We have a long,
21 long way to go.

22 Here's an interesting quote for one of the CEOs
23 where he said, "You know what? My CFO doesn't get this.
24 Here we are focusing on the business value and the
25 business case, and I've presented it to my CFO, and he

1 doesn't get it." But that's not important at this
2 point, because it's going to be painful for a while
3 until we get going and we start driving the benefits
4 out, we get the scale, and we get a more robust set of
5 technology in place.

6 So, this is a global phenomenon. It's not just
7 happening here in the United States or even just in
8 Europe. There are a lot of big programs going on in
9 Europe, but we have active projects going on in Japan,
10 Australia, Brazil. Any company, let's say, in the
11 electronics industry that is part of any of these
12 programs that our panelists are going to talk about are
13 evolving, they have to engage Asia, because they have
14 manufacturing and distribution operations in Asia, and
15 so their Asian operations are going to have to get
16 involved in this. It's not just a U.S. and European
17 thing.

18 It's not just CPG. It's not just toothpaste and
19 paper towels. It involves consumer electronics,
20 electronic media, apparel, pharmaceuticals, and it's not
21 just about case and pallet-level tagging in the supply
22 chain. There are business cases and applications
23 today -- and you'll hear about some of them here --
24 where it gets down to item-level tagging to really get
25 the business value to solve the problem. That's a here

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1 and now issue and phenomenon.

2 So, that's just a little bit of context. It's a
3 marathon that we're in. You may look at any one of the
4 individual piece parts and say, what's going on here?
5 But that's not really the point, at least according to
6 the CEOs of the companies that are actively involved in
7 this.

8 Okay, Chuck.

1 a sign that he will hold up to let us know that we are
2 going over the limit. It's supposed to say "Stop now,"
3 but instead it says, "Two minutes left," but that
4 doesn't mean you actually still have two minutes. It
5 means you should stop soon.

6 And finally, with regard to bios and things like
7 that, what I really did at the beginning was just the
8 first couple of lines of the bio of each individual. If
9 I read all of the bios, we would have been here for the
10 first 30 minutes. This is an incredibly impressive
11 group of panelists, and so feel free to take a look at

1 interested in this and some of the benefits that they
2 see related to RFID. I also want to give you a little
3 bit of a reality check in terms of talking to you about
4 where our entire industry is with regard to RFID. I
5 also would like to share with you a little bit of the
6 economics behind RFID that our retailers and
7 manufacturers are looking at. I'll talk to you a little
8 bit about some alternative uses of RFID that you may not
9 be aware of that have been discussed within our
10 membership. Finally, I'll briefly touch on what some
11 other industries are doing and then take a real quick
12 look at the future. So, let's go ahead and get started.

13 Who is the Retail Industry Leaders Association?
14 Well, RILA is an alliance of the most successful and
15 innovative retailers and suppliers in the world today.
16 Our members represent more than \$1 trillion in sales
17 annually and operate more than 100,000 stores,
18 manufacturing facilities and distribution centers, both
19 domestically and worldwide. We do have facilities in
20 all 50 states as well as internationally, and our
21 members employ millions of workers both domestically and
22 worldwide.

23 Through RILA, retail leaders and the critical
24 disciplines of the retail industry work together to
25 improve their businesses and the industry as a whole.

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1 Our mission as a trade association is to serve the
2 successful and innovative retailers and suppliers
3 through world class education, innovation and advocacy.
4 So, there is my promo. I hope I made it under 60
5 seconds.

6 Who our membership is I'm sure is a little more
7 interesting than that. This is a sample of some of the
8 retailers as well as manufacturers and service suppliers
9 what we represent, AutoZone, Best Buy, Dollar General,
10 Family Dollar, Food Lion, The Home Depot, Gap, Lowe's,
11 Michael's Stores, PetCo, PetSmart, Target, Tractor
12 Supply and Wal-Mart. On the manufacturing and service
13 side, companies such as 3M, American Greetings,
14 Coca-Cola, Eastman-Kodak, Energizer, Federal Express,
15 Gillette, Hallmark, Johnson & Johnson, Procter & Gamble,
16 UPS, Unilever, Time Retail, VF Corporation and Williams
17 & Dickey.

18 So, why are folks so interested in RFID? Well,
19 it's pretty simple actually. This slide best represents
20 why our industry is taking such a close look at case and
21 pallet tagging in the supply chain. The number I'd like
22 to draw your attention to is the number in the middle,
23 the 6 to 10 percent waste that is found through lack of
24 visibility or poor visibility in the supply chain. This
25 is an issue where we believe tagging at the case and

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1 pallet level will give us the opportunity to enhance our
2 visibility, and frankly, cut into this waste.

3 So, what are the benefits? I think you've heard
4 some of our earlier panelists talk about the benefits.
5 These are what we call success factors for retailers.
6 Reduce on-hand inventory and basically reduce and have
7 less use of safety stock. For those of you who aren't
8 in retail, what safety stock is, on occasion, we're
9 known to order lots of stuff because we're worried that
10 we can't get more stuff in time when it sells out. In
11 many instances, that stuff tends to not be sold and go
12 to waste. So, that's obviously some inefficiency for us
13 there.

14 Increase sales through reduced out-of-stock.
15 Obviously if we have it on the shelf and we know where
16 it is, we can increase our sales. Increase stock
17 visibility and availability at the point of shipment,
18 suffice it to say that means if we know where it is,
19 it's going to be easier for us to ship it and transport
20 it properly. This will lead to reduced transportation
21 costs and reduction of shipping volumes, which will
22 increase our efficiency. We'll also more accurately
23 forecast, and stock replenishment will be another result
24 of this, because we will have visibility in the supply
25 chain and be better able to tell when and where things

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1 date is a huge benefit to consumers, as you will not buy
2 aspirin and then have it expire on you three months
3 later.

4 Finally, easier identification on recalls. At
5 the case and pallet level, if there's a recall issued
6 and we know where those cases and pallets are, that will
7 give us the ability to bring that product back and
8 increase the ability of the retailer to get to that
9 product prior to it reaching the actual customers. So,
10 those are the benefits, both for retailers and we
11 believe for consumers.

12 What I'd like to talk about now is to almost
13 give you a little bit of a reality check, and these are
14 the two words we use most frequently when we talk about
15 where RFID is in our industry. I think even Simon would
16 agree that Wal-Mart, probably being one of the more
17 advanced companies, is still very much in this mode of
18 discovery and exploration, learning something new every
19 day, but at the same time also realizing that this
20 system by no means is a sure thing at this point.

21 You have heard about Wal-Mart, you have heard
22 about Albertson's, you have heard about Target or Tesco
23 and Metro with issuing some of the mandates and also
24 looking to implement the technology within 2005 or 2006.
25 Several other retailers have pilots in the field and

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1 have not issued mandates in terms of telling their
2 manufacturers they'd like to have the cases tagged by a
3 certain time.

4 The first group I mentioned to you that I listed
5 by name are what we would call the innovators. The
6 second group are who's conducting pilots, and those
7 pilots are generally being conducted at either the 900
8 megahertz level or the 13.56 megahertz level. The
9 second group that's just conducting pilots are what we
10 would call the early adopters, and as we know in the
11 curve of adoption of technology, those are the first
12 two, and then the big portion of the curve is next.

13 The big portion of the curve, the majority of
14 the retailers who we represent are basically six to
15 twelve months away from even putting a pilot in place.
16 They're developing a plan, they're getting a team
17 together, but they're not ready to put a pilot in place.
18 They're taking a wait and see. They're trying to gain
19 some advantage by not having to learn the lessons on
20 their own, and at the same point, they are still very
21 much behind some of these innovators and early adopters.

22 Some of them are also focused on issues like
23 data synchronization, which is not a prerequisite to
24 RFID; however, without doing it, you will not reap 98
25 percent of the benefits that RFID can bring to your

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1 organization. Data synchronization is a whole other
2 topic for a whole other day, but it is something that's
3 taking an enormous amount of time from retailers and
4 manufacturers alike and is a large hurdle to overcome

1 hardware, which you hear most frequently about, that
2 does have some significant numbers attached to it, is
3 only 3 percent of the cost. It's a small amount.

4 The other significant portions of the costs
5 include the people costs, what it takes to train the
6 people, to get them in place, to get them more adept to
7 work with this technology. And then finally, the
8 software cost is roughly three-quarters of the bill, and
9 that's not talked about frequently. So, if you can
10 imagine that those numbers that I was just throwing out
11 to you represent a very small portion of the cost, you
12 can understand that this is a hefty project to take on
13 if you're a retailer, and it gives you a little sense of
14 the reality behind the investment that's required to
15 make this work within an infrastructure.

16 Real quickly, I'd like to talk about some of the
17 talked about item-level tagging and the economic
18 feasibility behind that. In fact, to take it to the
19 extreme, there's a particular member of ours who while
20 we were in a meeting was talking about the fact that
21 they sell items that are less than 5 cents. So, why
22 would you put a 5 cent tag on an item less than 5 cents?
23 Now, obviously that's the extreme, but it even leads to
24 the fact that there's a leading technology firm that has
25 come out with a statement that they do not foresee items

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1 under \$10 being item-level tagged until the earliest
2 2017. So, you get a sense of the infancy, where we are.

3 Oh, he's giving me the two minutes left. I have
4 so much good stuff, though. I'm going to go just a
5 little bit longer, I promise, and Simon will make it up
6 on his end. We made a deal.

7 So, I just wanted to give you a real quick sense
8 of the costs and everything that goes into doing that.

9 Finally, I'd like to talk real quick about the
10 alternative uses. Two things that have been discussed,
11 these have not been tested nor have they been piloted,
12 so these are simply discussions. One of them is using
13 RFID on very high-cost items for warranty information,
14 to frankly simplify the process, and that has been
15 talked about as when you give the consumers the option
16 to do that.

17 The other is, interestingly enough, you hear a
18 lot about this downflowing supply chain and using RFID
19 there. We've had some retailers express interest in --
20 well, I would like to use RFID in my reverse supply
21 chain. In other words, once the customer returns the
22 product to me, I would then like to slap an RFID tag on
23 it and track it up through my reverse supply chain to
24 better understand the inefficiencies and waste that's
25 taking place there and tackle that.

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1 For the future, what do we see as a trade
2 organization? We see a lot of supply chain use. We see
3 a lot happening in the case and pallet level. We see a
4 little bit of testing going on in the item level. We do
5 not see widespread item adoption, widespread item
6 adoption or use for at least ten years, and I think with
7 the sense of the economics involved with this, you get
8 an understanding of why widespread item adoption really
9 doesn't make sense. There's a lot to learn in the
10 supply chain.

11 And then one final comment, the interesting
12 thing about retail is that unlike politicians who have a
13 vote that's coming up in September, our customers vote
14 with their feet every day. When it comes to RFID, we
15 want to keep them informed. It is in our best interests
16 to keep them informed, because if we do anything that
17 could possibly make our customers uncomfortable, we will
18 lose their business, and hence, it will cost us very
19 dearly. So, I just want to leave you with that, that
20 the retail industry is very interested in this
21 technology to enhance their efficiency and make the
22 customer experience better, not worse.

23 Thank you very much.

24 MR. HARWOOD: Okay, next we have Simon Langford
25 with Wal-Mart.

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1 MR. LANGFORD: Good morning. Thank you for the
2 opportunity to come here today and share with you how
3 we're using RFID right now and how we see using RFID in
4 the near term.

5 I think interestingly enough, if you think back
6 to the video that Sue Hutchinson showed, there was one
7 thing in there that really sums up the use of RFID in
8 the supply chain, and that is total supply chain
9 visibility, right from the manufacturer right through to

1 there on the shelf for them. They don't have to wait or
2 ask for those to be pulled out of the back room or visit
3 a different retailer. It's that visibility that is
4 taking stock out of the supply chain, so we get in that
5 just-in-time supply of product to meet the customer
6 needs.

7 Then within Wal-Mart and Sam's, then as I come
8 to a little bit later, store efficiencies, efficiency in
9 the distribution centers, and likewise in the supplier
10 as well. So, we've got collaborative benefits and
11 internal benefits that we all need to realize.

12 If we take a snapshot of the supply chain then
13 end to end, currently we have information when we
14 receive products, when we ship products, but that's
15 fairly limited. So, for example, we can't see when a
16 supplier who's in the manufacturing process if they've
17 got an issue. We don't see when they ship a product to
18 us.

19 And third-party distribution or LTL, less than
20 trailer load deliveries, that's very cumbersome to
21 receive at a distribution center, very poor visibility,
22 not only at the DC level, but at stores and clubs. We
23 have got limited visibility of where that stock is. So,
24 for example, we know that there's ten cases of product
25 in the store. We don't know where in the store that is.

- 1 can dial up the associate to go retrieve that product
- 2 and to merchandise it, even before it gets to the point

1 shelf wherever these products are, and I think in Sue's
2 video, there were some pictures of some flags on the
3 shelf to let the customers know that we have that
4 product on there with an EPC tag, and you can see here
5 an example of the leaflet on shelf, again, to let
6 customers know why we're doing this and that the product
7 has got an EPC tag on there, and they've got a choice.
8 They've got a choice then when they purchase that
9 product to remove that tag. We do not have any readers
10 on the sales floor. Our last read point, as you saw
11 there on the video, is as we exit the back room out onto
12 the sales floor.

13 And just to finish up, our consistent focus
14 going forward with our sellers and our suppliers is that
15 visibility of in-stock, driving increased sales, serving
16 our customers better, driving our currency, and we can
17 get equipment along with RFID equipment, that use of
18 equipment, how effectively are we using forklift trucks,
19 so on and so forth, but also cold chain compliance, I
20 think Dan touched on this area, that there will be in
21 the future tags available to monitor temperature. So,
22 again, we can ensure that products are fit for
23 consumption that have maintained chill compliance
24 through the supply chain, both driving for internal
25 efficiencies.

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1 This slide just really summarizes the benefits
2 which a lot of people touched on already about customer
3 in-stock, reduced inventory, theft prevention, lower
4 shrink in the supply chain, more efficient production
5 planning at the supplier, smart recalls and the dramatic
6 effect that can have, improved inventory control, and
7 then ultimately, less inventory counting at the DCs,
8 faster receiving of shipping, as I touched on at the
9 beginning, and overall improved quality inspection.

10 Thank you.

11 MR. HARWOOD: Thank you, Simon.

12 Next we have Bill Allen with TI.

13 MR. ALLEN: Good morning. It's a pleasure to be
14 here in Washington talking about my favorite subject,
15 which is radio frequency identification, and I'd like to
16 start off with a little bit of history of TI and our
17 presence in the market space.

18 Of course, TI, we claim to have a strong
19 heritage of innovation, perhaps the strongest. Mr. Jack
20 Kilby, one of our lower-level engineers, some 30 years
21 ago invented something that changed the course of
22 history, changed the course of the electronics age and
23 ushered in the electronics age, and in the year 2000 was
24 awarded a Nobel Prize for his efforts, and of course,
25 that was the invention of the integrated circuit.

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1 TI has been in this RFID space for 15 years now,
2 and we've surpassed the 300 million tag milestone just
3 recently, and we are active participants in standards
4 bodies around the world, ISO standards, IEC, ANSI, and
5 of course, now EPCglobal. In addition, TI RFID has
6 received a number of engineering excellence awards,
7 marketing innovation awards.

8 Some of the milestones recently that we have
9 surpassed, we've spoken about earlier, Dr. Engels talked
10 about the immobilizer technology that's used in Ford
11 products. In addition to that, if you drive a Jeep,
12 Chrysler, Mitsubishi, Toyota, Lexus, any time you start
13 your car, you're using RFID. You can't see it, but this
14 is a transponder that's inside the head of the key.
15 You're welcome to come out and look at the table, and we
16 have got some examples here.

17 This is the reader that's inside the steering
18 column. Now, they have a conversation, and they
19 authenticate each other to make sure that the driver and

1 livestock was that had the disease was the important
2 thing, and being able to do that quickly and identify
3 them very quickly and accurately would enable them to
4 have less losses.

5 As you recall, millions upon millions of
6 livestock were slaughtered because they could not track
7 and trace where these livestock had been and what feed
8 lots they were at, et cetera, et cetera. So, it's a
9 wonderful implementation.

10 And of course, on December 23rd of this year, my
11 phone rang when our PR agency called and said, Bill,
12 there's a number of publications that would like to talk
13 to you about livestock tracking here in the U.S., and of
14 course, now it's on the radar screen of a number of
15 associations, including the USDA, for identifying
16 livestock. We had our first mad cow episode, if you'll
17 recall, December 23rd. I remember it well, because I
18 was on vacation.

19 Another application that was talked about a
20 little bit this morning was library books. 3M has
21 developed a wonderful implementation of RFID, and until
22 most recently, you will, in fact, be reading -- if you
23 keep up with RFID news, perhaps in the next week, there
24 will be a press release announcing the Vatican has
25 decided to use RFID to track books in their libraries

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1 and eventually some of the artifacts that are contained
2 within the Vatican museum. It's a wonderful
3 implementation of RFID.

4 And hopefully we have some ExxonMobil SpeedPass
5 users out there -- thank you, Lyle -- hopefully you have
6 this on your key ring. If not, go buy one -- or
7 actually, it's free. You can just sign up for one. And
8 7 million customers in the U.S. are using ExxonMobil's
9 SpeedPass to speed their way through the somewhat
10 inconvenient activity of filling your car up with gas,
11 and it's been also introduced in Japan, Singapore and a
12 facility in other markets around the world. Shell has
13 the implementation in Canada as well.

14 Marks & Spencer has been a long-time user of
15 RFID. They are currently using RFID to track 4 million
16 trays within their supply chain, and it's within their
17 chilled foods and fresh foods supply chain. They picked
18 up eight hours of store shelf life by speeding things
19 through the supply chain more quickly. They also
20 reduced their touch labor in managing these products,
21 reduced it by 80 percent, and their estimation was that
22 the ten-year cost of an RFID system that they
23 implemented would be one-tenth of the original bar code
24 solution that they implemented.

25 And here we are with a new innovation. Perhaps

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1 you've seen this commercial. All drivers recognize
2 their cars. Some cars recognize their drivers. This is
3 Smart Access, a feature introduced in Lexus models last
4 year or this year, and it actually identifies the driver
5 as the driver walks up to the automobile and
6 automatically opens the door or actually unlocks the
7 door, sets the seat, as Dr. Engels said, perhaps adjusts
8 the radio station, makes you a cup of coffee, whatever
9 you want.

10 Here are some other implementations. Of course,
11 we're talking about warehouse and supply chain
12 logistics. This is Bloemenveiling, which is the largest
13 flower auction in Holland. Bloemenveiling has to manage
14 100,000 carts of flowers, about a half a million trays
15 of flowers, and get this, they process 37,000
16 transactions per day, and it's all done with radio
17 frequency identification, and they have cut their order
18 processing by several hours, they have increased their
19 accuracy of order fulfillment to 99 percent, which was
20 their ultimate goal.

21 Product authentication, when a consumer goes out
22 to buy something, if it's a high-value brand, it's a
23 good thing that that's an authentic item, and RFID can
24 certainly be used to authenticate high-value or branded
25 type items. But in addition to that, there's a

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1 gentleman who plays professional football that I had the
2 pleasure of spending some time with recently. Did you
3 know that 60 percent of all sports memorabilia out there
4 is non-authentic? So, Mr. Emmet Smith was very
5 interested in using RFID to authenticate sports
6 memorabilia and is going to become globally involved in
7 this particular market.

8 Chip wafer manufacturing is another interesting
9 implementation, and yes, we do indeed, as someone told
10 me the other day, we do eat our own dog food. We
11 actually use the RFID tags to identify wafer trays as
12 they are processed, and it tracks what processes have
13 been performed and writes the information to the tag.

14 Some additional implementations. Test tube
15 tracking ensures the accuracy in tube identification,
16 and also, this is to protect patients, after all. Major
17 marathons was talked about, and my daughter ran the
18 Portland Marathon here recently. I was able to track
19 her progress through the race, for the whole time
20 essentially.

21 Of course, livestock, protecting food supply and
22 the quality of that food supply. Others, toll tags, I
23 can't live without mine. Every day I use it on my way
24 to work. It saves consumers time and also reduces
25 emissions, because there are less cars sitting in line

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1 trying to get through the toll booth.

2 Event access and ticketing is another major
3 implementation of RFID. If you go skiing in the Alps
4 this year, chances are you will use an RFID-enabled
5 ticket. Building access control, another very, very
6 popular implementation of RFID.

7 There's more. RFID keeps minors safe in Great
8 Britain. RFID keeps children safe at theme parks. RFID
9 keeps hospital patients from getting the wrong blood
10 type. It ensures that injured soldiers in Iraq get the
11 right medical procedures. Here's a wristband that's
12 used in this particular implementation. Tracking tree
13 growth patterns in the State of Washington; tracking
14 critical files in law offices; providing secure access
15 for the Academy Awards; and in tracking salmon migration
16 patterns, all kinds of many, many uses.

17 The state of the market? Well, RFID is not
18 emerging anymore. There are more than a billion
19 transponders deployed worldwide. RFID has been
20 delivering an ROI for many, many businesses for many,
21 many years. It's not something that's just come on the
22 scene. RFID has created new markets. It's benefitted
23 customers and consumers for many years.

24 When technologies come along, new technologies
25 present new opportunities. It requires us to ask the

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1 question, is there a better way to do something? It
2 presents an opportunity to rethink, redeploy and
3 re-engineer the entire enterprise. But for consumers,
4 it provides new conveniences. It provides more safety
5 and security.

6 So, let me get a few things straight finally.
7 There is no perfect frequency. They're all good. They
8 all have their own pluses and minuses, as was discussed
9 earlier.

10 Another thing to remember, RFID is not a cure
11 for bad business practices. If your supply chain is
12 fouled up, throwing a new technology at it is probably
13 just going to increase that.

14 The RFID industry has and will continue to
15 respond to concerns about the technology, and to get
16 this right, which we all have to do, it takes
17 collaboration between technology companies, industry
18 organizations, government agencies and end user and
19 consumer groups.

20 Who wins in this scenario opfrltion0lfy.

1 of consumers safer, more secure, easier and more
2 convenient. So, everybody is a winner.

3 Thank you.

4 MR. HARWOOD: All right. Well, thank you very
5 much, Bill, and next we have Ken Fishkin with Intel
6 Research in Seattle.

7 MR. FISHKIN: Good morning, everybody. It's a
8 pleasure to be here this morning. I'm going to be
9 talking about RFID particularly in the health care
10 industry, some of what people are doing now and then
11 some of the more speculative, longer-range things that
12 people are looking at in academia and research.

13 Health care is actually a pretty good monitor of
14 RFID. First of all, as we just heard, a lot of the
15 impetus for RFID or one of the big apps was the
16 livestock industry, and it sort of has this unexpected
17 benefit for health care, but for example, many RFID tags
18 are very robust to heat and grime. Some of Bill's tags,
19 for example, can survive sterilization and autoclaven,
20 which is very nice in the hospital domain.

21 RFID can be worked with no special user action,
22 you know, you're not doing this stuff. The fact that
23 there are a lot more bits in the tag in the health care
24 industry means that you cannot just say this is a bottle
25 of medication X, but you can say, this is that patient's

1 bottle of medication X with this expiration date, and
2 they should take this many per day, they should not take
3 it with that, et cetera. You can pack all that
4 information in there.

5 And finally, because of the very high value
6 proposition in the supply chain as we've heard and we'll
7 hear more of later, cost is really just this huge
8 show-stopper, which may be true also here, because the
9 value proposition is so high. If you're going to keep
10 somebody from taking the wrong drugs, if you're going to
11 improve the health or stability of an elder, if you're
12 going to increase child safety, whether it costs you \$40
13 or \$50 worth of RFID tags is not going to be a
14 show-stopper.

15 Then there's another piece of technology that we
16 haven't heard much yet that is a nice match with health
17 care, which is a new wave of RFID readers. Most of the
18 applications -- actually, all of the applications you've
19 heard of so far use these dinner plate sized reader
20 antennas. In the petting zoo, they actually have some
21 of them out there that they're using, and the reason
22 that they use those is because they have this nice long
23 range, you know, couple of feet, couple of meters.

24 Well, if you're willing to give up on that range
25 and have an RFID reader with a range of like an inch,

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1 then you can have these very, very small readers, and
2 there's a picture of one you see there about the size of
3 a quarter. I saw one last week about the size of a
4 dime. So, those things -- and that's so small that you
5 can actually sort of fit them into some nice niches into
6 some health care scenarios, which I'll talk more about
7 in a couple slides.

8 So, then when we talk about some of the
9 applications domains in specific, so within a hospital
10 domain, probably the most common thing that's being done
11 right now is this really goods tracking, really supply
12 chain management, except now what you're tracking is
13 where is this piece of equipment? Where is the crash
14 cart? Where is this patient's chart? Where is this
15 doctor right now? I just read about a project they're
16 doing in Dallas with tagging the babies, to make sure
17 that the right baby goes with the right mother and that
18 nobody takes the baby out of the hospital.

19 Now, that's really conceptually, though, really
20 similar to the supply chain issue, except now you're
21 just tracking a different set of things. So, I'm not
22 going to talk about that much more. I'll talk a little
23 bit, though, about these scenarios involving these
24 really small readers.

25 These small readers are small enough that you

1 can basically integrate them into high-value pieces of
2 hospital equipment, and they serve really as smart
3 connectors, to make sure that when you stick RFID tagged
4 object A into receptacle -- RFID reader receptacle B,
5 you did the right thing. People are talking about, as
6 we just heard from Bill, with blood bags, to make sure
7 you put the right blood into the right IV drips; with
8 anesthesiology, gas dispensing, make sure you plugged in
9 at the right time, et cetera.

10 There's another thing that we're actually about
11 to hear about, an FDA movement to require RFID tags on
12 pill bottles by 2007. So, one thing people have been
13 looking at in research is let's pretend it's 2008, what
14 can RFID do to help improve the quality of home health
15 care and medicine? This is a field that's actually been
16 entered by Accenture. This is a prototype that we get
17 from Seattle where one of the things you can do is you
18 can take these RFID readers, you combine them with a
19 digital scale, so now when somebody takes the pills, you
20 know not only that they took some pills, but how many
21 they took, and you're looking at the weight difference
22 when they put it back, and you can then integrate that
23 into a system, whether in the home or in the hospital,
24 that can do readings, reminders, prompts, it's time for
25 you to take this, you didn't take enough of that and so

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1 forth.

2 Now, a more speculative approach that we're
3 pursuing is to say, okay, now if we've got a bunch of
4 these objects getting tagged, if there are enough of
5 those objects around you in either the hospital or home
6 environment that are tagged, could we tell what you're
7 doing by looking at what tagged objects you're
8 interacting with at any particular time? This is
9 something we call the invisible man approach. If any of
10 you have ever seen invisible man movies, there are all
11 these scenes where there's an invisible man, so you
12 don't see him, but by what he's using, where he's using
13 it and the sequence he uses it in, you and the audience
14 all know what he's doing, that he's making a phone call,
15 he's brushing his teeth, he's having a cup of coffee.

16 So, the idea is that if we can detect
17 interactions with RFID-tagged objects, perhaps we can
18 help in this activity assessment, and I'll talk more
19 about how this could apply in two of these domains.

20 First, in the elder care domain, all right,
21 there's a case with elders with early stage kind of
22 decline where, for example, any nursing home that takes
23 Medicare funds has to fill out these so-called ADL
24 forms. ADL stands for activities of daily living or
25 things, as you see here, like using the phone, getting

1 We're doing a similar project along this line in
2 the hospital domain, more of the idea is to deal with
3 med school student grading and training. They have
4 these labs, these simulation labs, where these students
5 go through these procedures, and again, the doctors need
6 to take a lot of time and be in a lot of places to see
7 what the students are doing in the simulation. This
8 results in, for one thing, they're not doing the
9 simulations very often, because they don't have the time
10 for it, the doctor's time is vital, and secondly, again,
11 they miss things.

12 So, here's a case where you can actually ask the
13 med school students to wear gloves. So, they wear
14 gloves that look like this. They go do their
15 simulation, and they look at the data log and, again,
16 use that to help infer and assess how they're doing the
17 activities. This is a pilot project we're doing right
18 now at the University of Washington in the
19 Anesthesiology Department.

20 Since I'm here with a regulatory audience in
21 Washington, I would also say that for our next step,
22 we're trying to see if we can test this in the OR suite,
23 still with no real people, but in the OR suite. And
24 there are regulatory issues involving what RF
25 frequencies can be used with what power in an OR suite

1 and then be able to be refined. So, if any of you out
2 there know what the answers are to those questions,
3 please see me.

4 Okay, so now let's see a video. So, now Intel
5 has made this lovely concept video showing some of the
6 things we're talking about now, again, a few years out,
7 where the form factor is a little bit nicer. The pad
8 you saw before is now actually the thing on the lower
9 right, this nice little stainless steel thing, and the
10 glove has been replaced by a bracelet.

11 So, I am going to have to do that -- pardon?
12 Yes, escape you, escape you, double click you.

13 (Videotape played for the workshop
14 participants.)

15 MR. FISHKIN: Hmm, hmm, hmm, I think I've
16 bottomed out on everything. So, I think I'll just end
17 the talk now.

18 MR. HARWOOD: Thank you, Ken, we appreciate the
19 presentation, and let's see, our next presenter is Paul
20 Rudolf, Paul Rudolf with the FDA. Dr. Rudolf?

21 DR. RUDOLF: Thank you very much. It's a
22 pleasure to be here. I was a member of the FDA
23 Counterfeit Drug Task Force last summer through the
24 spring. The task force no longer exists. The FDA
25 issued a report on counterfeit drugs, which you can all

1 find on our Web site, www.fda.gov, if you would like to
2 find more information about our approach to counterfeit
3 drugs and in particular about RFID.

4 I'm going to talk a little bit initially about
5 counterfeit drugs and then talk about how we think RFID
6 can be used to combat counterfeit drugs. Last summer,
7 there were a whole slew of reports of counterfeit drugs
8 in the distribution chain. It was the thought of the
9 Commission and the rest of us at that time that
10 counterfeiting drugs was a particularly heinous crime,
11 much more so than counterfeiting clothes or sporting
12 goods or anything else, and that we needed to be very
13 proactive in combating counterfeit drugs, preventing
14 them from being introduced into the distribution chain,
15 and we thought it was a potentially huge public safety
16 issue.

17 Last summer and hopefully now, we thought that
18 the U.S. drug supply was the safest in the world. There
19 was a very small number of counterfeit drugs on the
20 market. In other countries, it's a huge problem. Up to
21 50 percent of drugs in some countries are thought to be
22 counterfeit. Some classes of drugs, such as
23 anti-malarials, certain vaccines and others, are known
24 to be counterfeit, and there are regular reports of
25 people dying of illnesses that can easily be prevented

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1 because the drugs are fake.

2 You hear a very little bit about the approach
3 that Nigeria is taking with counterfeit drugs. There's
4 a very active woman who's the head of their equivalent
5 of the FDA, and she's being very proactive, literally
6 closing down pharmacies who sell counterfeit drugs,
7 having bonfires burning counterfeit drugs.
8 Unfortunately, most other developing countries have not
9 been quite as aggressive.

10 We have noted at the FDA that there are at least
11 20 or 25 counterfeit drug investigations that are
12 opening every year, and that actually -- obviously, it
13 wasn't underscored, it minimizes the actual problem,
14 because each investigation usually involves hundreds of
15 people, hundreds of companies that are involved in these
16 schemes to introduce counterfeit drugs.

17 The counterfeiters in the world are becoming
18 increasingly sophisticated. They have access to a wide
19 range of very sophisticated technologies, so they can
20 very accurately reproduce the labeling, the packaging,
21 the bottles, the drugs, the pills themselves, with the
22 embossing, and it's really quite amazing to see some of
23 these pills that even experts can't distinguish from the
24 authentic products.

25 Now, of course, counterfeit drugs can be sold

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1 over the internet, can be imported into the United
2 States. So, we saw it as a huge potentially increasing
3 problem, and this is just a graphic with the number of
4 cases that we've opened.

5 So, with regard to the overall approach to
6 counterfeiting, we saw that there were about five places
7 in the drug distribution chain and the overall
8 marketplace that could be addressed to secure the U.S.
9 drug supply, and the first is the one that I talk about
10 today, securing the product in packaging. Clearly the
11 issue is about regulatory oversight, putting these
12 people in jail, reporting, educating consumers, all that
13 kind of stuff.

14 What we determined through our investigation,
15 through gathering information, is that the most
16 important thing to fight counterfeit drugs was the
17 establishment of a reliable pedigree, and that's been
18 talked about by some of the other speakers, the ability
19 to track and also trace in reverse logistics exactly
20 where a drug is going and where it's been, every single
21 custodian of the product.

22 At the end of that, the pharmacist can actually
23 look at a computer screen hopefully at some point and
24 look at the entire history of the drug bottle that just
25 arrived in his pharmacy and be very secure that that is

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1 an authentic product. We determined or we thought that
2 RFID could not only provide such a pedigree, but it's
3 probably the best way of providing that pedigree, and
4 it's the cornerstone of what we felt to be the fight
5 against counterfeit drugs in the United States and in
6 the world.

7 Now, in our report, we differentiated between
8 mass serialization, which is the unique number or the
9 EPC code which has been discussed and the actual
10 mechanism for reading that and associating information
11 with that number, which involves tags, readers and the
12 information infrastructure that you've all seen.
13 Obviously you've seen several tags, you've seen what the
14 code would be.

15 Now, many of you are probably not very familiar
16 with the way drug coding works now, but there's a code
17 that every drug has called an NDC code, which shows who
18 the manufacturer is, what kind of pill it is, is it
19 Lipitor, is it Viagra, the number of pills in the
20 bottle, a whole slew of information about the product.
21 It's not clear what will happen, but if there is an EPC
22 code associated with an individual bottle, it will
23 probably include the NDC number as well as other
24 information.

25 The reason why we differentiated mass

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1 talking with folks at Wal-Mart, various manufacturers,
2 being involved with the Accenture project, we felt that
3 the widespread adoption of RFID in the pharmaceutical
4 supply chain was reasonable or feasible in 2007.

5 What that meant to us was that we felt that not
6 only could all cases and pallets be tagged with RFID
7 tags, but a large number of pharmaceutical bottles,
8 individual bottles, would also be tagged by 2007. That
9 doesn't mean every single drug. We know that there are
10 issues with certain types of drugs that would make it
11 harder to put tags on them -- liquid products are a good
12 example -- but we felt that the vast majority of drugs
13 could be tagged in 2007, and quite frankly, in being out
14 and speaking in various places and being in contact with
15 folks, I don't think that we have any notion of pulling
16 back from that right now. We think it's very feasible,
17 and we think it's very likely to happen.

18 We've heard an awful lot about some of the
19 drivers to RFID adoption. There are a couple within the
20 pharmaceutical industry that I wanted to mention with a
21 Florida pedigree law. There's a new law that was passed
22 in Florida, and I guess most people don't realize it,
23 but states regulate drug wholesalers, and drug
24 wholesalers have been a major conduit for the
25 introduction of counterfeit drugs, and the wholesalers

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1 basically handle the product between the time they leave
2 the manufacturer and the time they arrive in the
3 pharmacy, and some products go through one wholesaler,
4 some products can go through 10 or 20 wholesalers
5 depending on the price of the drug and what the
6 marketplace looks like on that particular day and week.

7 Because of current business practices in the
8 wholesaler industry, it's not that hard to introduce
9 fake or diverted product back into the supply chain, so
10 Florida passed a very stringent law which requires
11 pedigrees on all drug products by July of 2006, which
12 means that every bottle of drugs has to have a piece of
13 paper attached to it that says exactly where that drug
14 has been from the time it was manufactured to the time
15 it arrived at a pharmacy.

16 Well, as we all know, paper is very hard to deal
17 with, and you can imagine every package of drugs in the
18 State of Florida having a sheathe of papers associated
19 with it that people have to thumb through to figure out
20 where the drug has been is a pretty cumbersome process.
21 A lot of wholesalers have thought that they would be put
22 out of business, because they can't possibly manage all
23 that paper, especially big wholesalers.

24 I've been in some warehouses, McKesson and
25 Cardinal and AmeriSource, the three biggest drug

1 wholesalers in the United States, and they fill
2 thousands of orders every day, and they have millions of
3 drugs coming in every day, and there's just no way that
4 they could process all that paper. So, the wholesale
5 industry has sort of grabbed onto RFID as a way of
6 complying with the Florida pedigree law and being able
7 to handle all the shipments they get and all the
8 shipments that they start and initiate to get to all the
9 pharmacies in Florida, and it's quite likely that other
10 states are going to pass very stringent pedigree laws as
11 well, and that's going to be a big driver in the
12 pharmaceutical industry for RFID, because wholesalers
13 are going to absolutely require RFID to do their
14 business.

15 The one other thing that was mentioned
16 previously that is particularly important in the
17 pharmaceutical supply chain are recalls. It's
18 critically important to do recalls as quickly and
19 efficiently as possible, and right now, it's a very
20 cumbersome, paper-driven process, and a lot of consumers
21 don't know whether they have a bottle of drugs that need
22 to be recalled or not. With RFID, you can literally
23 only recall those particular bottles which are at issue,
24 and you can do it literally within a day. You can save
25 millions of dollars, save a lot of people from being

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1 with and that folks also can comply with our expectation
2 in 2007. We're working on product quality issues. Does
3 the electromagnetic energy affect certain drug products,
4 where we know that some manufacturers are doing some
5 studies right now to make sure that that is not the
6 case. We've talked with industry about privacy issues.
7 That's not something that we would directly regulate or
8 be involved with, but we have the expectation that
9 industry will deal with privacy issues, such as killing
10 tags when consumers purchase drugs.

11 One other thing that we're interested in which I
12 thought I would mention is the potential to use tags to
13 provide information to patients. Now, this obviously is
14 a two-edged sword. As was mentioned earlier, it's a
15 huge potential conduit to give useful information to
16 patients at the time they purchase drugs because of the
17 product information that can be associated with the drug
18 product. Obviously pharmacists would get that same
19 information.

20 On the other hand, it's also potentially a way

1 wholesalers can put ads in the database. They can put
2 other types of information in there, and so there's a
3 whole series of issues like that that we're concerned
4 about that we're going to have to think about as RFID
5 gets more widespread.

6 The last thing I want to mention are database
7 issues. Those were touched upon before, but in the
8 pharmaceutical industry, they're really extremely
9 important. Is the database that people are going to
10 have access to a distributed database where every
11 participant in the supply chain has limited access to a
12 small amount of information about the product, or is it
13 going to be a centralized database and everyone has
14 access to a lot more information? In the pharmaceutical
15 industry, that's yet to be worked out, and that may be
16 one thing that could delay the adoption of RFID.

17 Then the last thing that I want to mention
18 before I finish is that clearly RFID is not the end-all,
19 be-all. It's going to require people to actually use
20 it, and it's going to require some amount of due
21 diligence, and one of the things that clearly is going
22 to need to happen at some point is in the pharmaceutical
23 industry, if you purchase and sell drugs, you need to
24 only do business with people who are RFID-enabled and
25 use RFID.

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1 A drug, even with RFID, a drug could clearly go
2 to a wholesaler where there's no RFID, so it's not
3 scanned in or scanned out, it's just in a huge hole for
4 two or three days, who knows what might happen to that
5 bottle, and then it gets shipped to another wholesaler
6 who is RFID-enabled, and unless someone catches the fact
7 that it took longer than it should have to get from this
8 wholesaler to this one and think that maybe there is
9 somefrommhould have to get aybe there is

1 the cautionary note about the privacy implications of
2 RFID, but it's not going to be a really privacy-oriented
3 discussion, because I think a lot of what we're going to
4 be talking about later this afternoon will focus on what
5 are the privacy issues. So, what I want to do today in
6 my time is talk about how government RFID use and
7 government-mandated RFID use is sort of a distinct
8 problem from the retail RFID privacy issue.

9 It's fairly obvious that government is moving
10 into RFID in a very big way. I have got a handout
11 outside that lists a lot of the current and contemplated
12 government uses. We can start with DoD's mandate in
13 October 2003 requiring all of its suppliers to use RFIDs
14 by January 2005. This is going to be a big potential
15 driver for item-level tagging.

16 The Homeland Security Department, from what we
17 can tell, is already using RFIDs in its U.S.-Canada
18 nexus, latest traveler card, and is talking about using
19 RFIDs in boarding passes. Obviously as people have
20 talked about, there are a lot of transportation sector
21 uses. This is an obvious one because of the economics
22 of transportation, the toll cards, the use of RFID
23 devices makes sense there from an economic standpoint.

24 Money, the European Union has been looking at
25 putting RFIDs into currency. We heard at one workshop

1 even within the last couple of months that there is
2 actually a country in the world right now that has
3 already embedded RFIDs into their currency, but I don't
4 know which country that is. The Treasury Department is
5 apparently looking at RFIDs in currency as an
6 anti-counterfeiting device.

7 Schools, you know, this is something that we're
8 hearing about a lot, that at a very low sort of grass
9 roots level, people are looking at using RFIDs to
10 essentially track students. There's a charter school in
11 New York that's begun to record the time of day students
12 arrive in the morning using RFID tags, and they want to
13 use them to track library loans, disciplinary records,
14 cafeteria purchases, visits to the nurse's office and so
15 on.

16 So, what is special or different about
17 government RFID or RFID-mandated uses? Well, one aspect
18 of it is not special, but I think it's worth
19 highlighting. Of course, it's the promiscuousness of
20 the RFIDs in general. A lot of what we are concerned
21 about in the privacy world does not manifest nearly as
22 much if the RFIDs are not promiscuous; that is, there's
23 security, cryptographic access controls and so on, but
24 we're not expecting that to be seen in a lot of the
25 kinds of applications we're looking at, such as in the

1 pharmaceutical area.

2 The second is a certain degree of persistence;
3 that is, we expect that RFID applications in the
4 government sector will not be intended or in the context
5 where we would necessarily kill them when we get the
6 device. The obvious example would be when RFIDs are
7 used or if RFIDs are used in, say, driver's licenses,
8 other kinds of ID documents, it's unlikely, given what
9 the Government would intend to use such devices for,
10 they would say, oh, yeah, go ahead and kill it.

11 The third is their pervasiveness. If schools,
12 Post Offices, money, public transit, et cetera, et
13 cetera, are going to be all using RFIDs, then we should
14 expect to see a fairly interoperable and pervasive
15 network of RFID sensors, and that should be something
16 that we ought to be concerned about from the privacy
17 standpoint.

18 Now, another government use example that EFF has
19 been very engaged in has been in the use of RFIDs for
20 tracking and tagging library books. We're based in San
21 Francisco, and the San Francisco Public Library, like
22 many other libraries across the country, are looking at
23 using RFIDs for item-level tagging of all borrowed
24 materials. Now, this has obvious advantages for the
25 library from a supply chain standpoint, but it has

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1 concerns for privacy.

2 The obvious question of associating people's
3 identity with the content or preferences that they have
4 in terms of what they read, you know, is a traditional
5 sort of reading privacy issue, and it has that
6 persistence issue, which is that you wouldn't want
7 people who were using this system for their tag to be
8 killed when the first patron, you know, borrows the
9 item. The whole point is that it's going to be coming
10 back. So, how do you deal with that problem?

11 This is something that a number of the privacy
12 groups have been trying to dialogue with the libraries
13 about. I'm hoping, actually, in San Francisco to stop
14 them from adopting RFIDs at all, because we've seen no
15 indication that they have a clear understanding of the
16 privacy issues or a commitment to using privacy
17 safeguards there.

18 But I don't want to focus too much on the
19 privacy aspects of that. There are two other issues
20 that end up coming out of this from EFF's perspective.
21 The first is a question of governance, and we're seeing
22 essentially agencies as small as the local public
23 library or a charter school to as large as the Defense
24 Department with 43,000 suppliers and somewhere in the
25 neighborhood of 45 million separate line items all

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1 talking or actually adopting RFID.

2 But where's the public governance as far as
3 these kinds of adoptions go? Where is the public
4 deliberative process in terms of fact-gathering, a
5 privacy impact analysis or assessments, technology
6 assessments? From a privacy standpoint, I do not want
7 to see, you know, my state DMV or my child's public
8 school being able to decide, well, we got a good deal
9 from an RFID vendor, we are going to start tagging all
10 the kids. I think there's a real need for a large-scale
11 public deliberative process to govern government use of
12 RFID.

13 The second point, of course, is that government
14 use can't be separated from private sector use from a
15 privacy policy perspective. We have to have a unified
16 approach. And the first most obvious reason, of course,
1 lcntnd nel tk hlyeoo0fgleoo aas far as

1 same thing, you end up with lower air quality or water
2 quality.

3 We think that in the privacy area, RFIDs
4 represent a form of privacy pollution, and we need to do
5 something to think about how we control the polluting
6 effects, and this is something that government would be
7 contributing to if government continues to adopt RFIDs.
8 Certainly whatever Wal-Mart does, the impact of the
9 Defense Department, of Postal Services, of schools, of
10 all of these government entities deciding that, yes, we
11 should be using RFIDs is going to, you know, radically
12 affect the demand for RFIDs and spread their deployment
13 much faster than otherwise would have been.

14 And then beyond just sort of these economic
15 effects, there is the legitimation effect; that is, if
16 your friendly neighborhood library is using RFIDs, how
17 bad can they be? If we have all of these sort of
18 supposedly beneficial or actually beneficial
19 applications of RFID, questions of when do we do
20 anything about the data privacy and tracking issues
21 associated with RFIDs will fade, will be left behind.

22 So, I have a few specific recommendations to go
23 along with this critique. The first is that we should
24 have specific legislative authorization with meaningful
25 privacy safeguards and not merely appropriations or

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1 agency-level processes before governments use RFID.
2 RFID should not be used by governments, at least not
3 promiscuous ones, to eliminate anonymity, and that
4 counsels against the use in driver's licenses,
5 passports, ID cards and such.

6 You should not allow law enforcement, in
7 general, to track people using RFIDs without meeting
8 Constitutionally stringent privacy safeguards. And
9 finally, we need to really consider whether or not
10 public entities -- in fact, I would say public entities
11 should not be allowed to gather information from private
12 sector RFIDs and vice versa, again, without stringent
13 Constitutional safeguards.

14 Thanks.

15 MR. HARWOOD: All right, thank you, Lee. Let's
16 see, before our final speaker, Peter Sand, I wanted to
17 remind you that if you have questions you would like us
18 to ask the panelists, you can go ahead and fill out one
19 of these cards that look like this, and they're in your
20 packet, and if you wave them around, our faithful
21 assistant in the back, Grant, will pick them up from you
22 and bring them up front.

23 Okay, with that, Peter Sand, do you want to go
24 ahead -- our final panelist here, then.

25 MR. SAND: Thank you, thank you very much.

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1 My name is Peter Sand, and I am the Director of
2 Privacy Technology within the Privacy Office of the
3 Department of Homeland Security, which means I'm
4 basically a human bridge between the people managing the
5 technology and the people managing privacy issues, and I
6 spend a lot of my time kind of shuttling information
7 back and forth to make sure that the technology people
8 understand the basic principles of privacy, and the
9 privacy people understand the details of the technology
10 that's implied.

11 I'm going to talk a little bit about the role of
12 the Privacy Office within the Department of Homeland
13 Security and then just go through a couple of quick
14 examples to give you a flavor for the kind of work that
15 we end up doing.

16 There are three basic measures that can be used
17 to assess the value of any new technology. The first
18 is, does it advance the organization's goal? The second
19 is, does it make the experience of using that technology
20 better for everybody involved? And finally, does that
21 new technology sustain privacy protections?

22 At the Department of Homeland Security, we
23 address that third measurement with the Privacy Office
24 led by the Chief Privacy Officer for the Department,
25 Nuala O'Connor Kelly. In fact, the mission of the

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1 Privacy Office is to ensure that as the Department
2 pursues its mission to secure the homeland, that it does
3 so without invading privacy.

4 The Privacy Office is organized along lines of
5 disciplines. There's an international focus. There's a
6 disclosure focus, which is basically Freedom of
7 Information Act responses, and there's a compliance
8 focus and a technology focus.

9 Within the technology area, the Privacy Office
10 seeks to operationalize privacy, which means to build
11 privacy protections into the actual system development
12 process so that privacy issues are raised and addressed
13 as the technology matures, rather than leaving privacy
14 as a final box on a long checklist of technology issues.
15 This way, we can ensure that all privacy issues are
16 addressed as the technology develops from beginning to
17 end.

18 At the same time, the Privacy Office is an
19 independent office serving advisory and oversight roles
20 within the Department. The Chief Privacy Officer
21 reports directly to the Secretary and also separately to
22 Congress to report on how the Department's use of
23 technology and operations affect privacy protections.

24 The key to understanding any need for
25 information technology is the information itself. New

1 information drives everything. It drives the
2 technology, and it also drives the privacy assessment.
3 When information is personal information, meaning it
4 identifies a person individually, the Privacy Office
5 adds into the regular development process an additional
6 step of public notice.

7 The Privacy Office works with the folks that are
8 evaluating and building new technology to identify any
9 potential privacy impacts which may be raised by that
10 department, and we do that by asking a long list of
11 questions, things such as, what information is being
12 collected? Why is it being collected? Where does the
13 information come from? How will it be secured? How
14 will it be checked for accuracy? If there is an
15 inaccuracy, how do people go about correcting those?
16 Who will have access to the information? How will that
17 access be managed? And the questions go on and on and
18 on.

19 We work with the actual developers to build
20 answers to these questions so that as the technology
21 matures and is used more within the Department, those
22 issues are raised and developed at the same time, and
23 all that information is published directly to the
24 public. This fosters openness and transparency
25 regarding how the Government uses personal information,

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1 and it ensures that when the Government, our Department,
2 finds a new technology that advances the organization's
3 goals and also improves the experience, that that use of
4 technology also sustains privacy protections.

5 And this process is repeated over and over and
6 over again. As a particular implementation of
7 technology changes, as a system is upgraded or as new
8 things are added to it, we repeat that process again so
9 that the public is notified as things change about the
10 implications of those changes.

11 I want to talk about two very quick examples.
12 The first is tracking baggage through the airport
13 system. These are things that the Department is looking
14 at. These are not things that have been finalized or
15 implemented. They're just avenues of pursuit within the
16 Department.

17 In terms of tracking baggage, the purpose is to
18 facilitate travel, to make sure that the bags go where
19 they're supposed to go and actually get there and get
20 there as quickly as possible. There are two issues that
21 are raised. The first is an issue of scope. You want
22 to make sure that when that job of tracking baggage is
23 done, that the technology that tracks information
24 related to that bag ends, that there's no continued
25 broadcast of that information. The second issue is

1 education, so that as a process like that is rolled out,
2 people understand what it is, how it works, what the
3 implications are and what kind of access they have to
4 the process itself.

5 The second quick example is border crossing.
6 Again, the goal using the technology there is to
7 facilitate travel. There's something like 330 million
8 actual crossings of borders a year, and the goal is to
9 get the appropriate level of information to the right
10 people at the right time so that they can inform
11 decisions in terms of facilitating that crossing.

12 The goal is to make that process work as quickly
13 as possible, hopefully faster than the current process
14 is now, and some of the issues that are raised are how
15 much information actually needs to be transferred during
16 that crossing. Can you use just a simple number that
17 would trigger a record in a database that will present
18 information to a screen rather than actually
19 broadcasting the information that relates to that person
20 directly?

21 And then another issue is control. Is there a
22 way to use technology to give the individual person
23 control over when information is broadcast, and is there
24 a button that you could put on something that the person
25 would say, okay, now that I'm here, I am going to send

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1 you my information, and not have it be an automated,
2 ongoing process?

3 That's a very, very quick review of what's
4 happening in the Department of Homeland Security
5 specifically with privacy. Thank you very much for your
6 time, and I understand lunch is soon, so...

7 MR. HARWOOD: All right, well, thank you, Peter.

8 All right, next we have got some questions, and
9 Lyle, should we start with the cards or do you want to
10 ask a few first?

11 MR. GINSBURG: As much as I relish the
12 opportunity to torture my panelists here, I do travel in
13 the same circles with some of these folks, so I think
14 we'd rather get to your questions first, but I'll save
15 some of mine for afterwards.

16 Paul -- and please make sure you speak into the
17 mic, if you can -- how can we stop fake pedigree
18 information being generated by counterfeiters?

19 MR. RUDOLF: Well, there's several ways to do
20 that, and some of them are fully technical and maybe
21 some other people on the panel would know better than I
22 do, but aside from limiting access to database, if a
23 counterfeiter had the money to actually -- had a foundry
24 to produce fake tags, the tags all have an actual
25 foundry number on them in addition to an EPC number.

1 So, there's one protection there.

2 If you know that Pfizer has purchased all their
3 drugs from one manufacturer, you'll know that the tag
4 might have a different foundry number on it, and you'd
5 know that it wasn't really a drug purchased by Pfizer.
6 Plus, each company will have a whole list of EPC numbers
7 which are active, and so what a counterfeiter would have
8 to do is they would have to hack into a database to know
9 which numbers were active for which drugs, and then they
10 also have to duplicate the pedigree information, because
11 an unauthorized person wouldn't have access to the
12 associated data.

13 So, you have the foundry number, you have the
14 potential for the need to hack into the database to know
15 which numbers are active, and then you have to duplicate
16 the pedigree information, and even then what would
17 happen is the bottle would show up in the system as a
18 duplicate. So, theoretically, the worst thing that
19 would happen is that both bottles with the same EPC
20 number would be located hopefully very quickly and be
21 tossed out of the system, because you might not know
22 which one was counterfeit if the counterfeiter was able
23 to produce the right pedigree.

24 So, you've got a whole slew of protections, and
25 then you have a minimal effect on the end in terms of

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1 when bottles are affected and thrown out.

2 MR. GINSBURG: Okay. Simon, why did Wal-Mart
3 conduct an item-level tagging pilot -- question, Broken
4 Arrow -- especially if it isn't currently using RFID at
5 the item level?

6 MR. LANGFORD: As a lot of people know, we've
7 conducted some field trial tests with the Auto-ID Center
8 since about 2000. We started at the pallet level, case
9 level and then started to look at item level, but it
10 very soon came to light that pallet and case was the
11 area to focus on, where the real benefits were in the
12 short term, medium term, and so that pilot didn't go any
13 further.

14 MR. WOOD: Real quick, and that really has been
15 the findings. As I talked about, the economics behind
16 item-level just doesn't make sense right now for
17 retailers to implement. So, we think the tests have
18 occurred, and there probably may be a few more retailers
19 who test, but ultimately, the realization is that the
20 real benefit exists in the supply chain, and that's
21 really where significant dollars can be saved, and I
22 think that's where you'll see implementation within the
23 retail industry.

24 MR. GINSBURG: Okay. Lee, there was a claim
25 that tagging library books with RFID is

1 privacy-invasive, but given that libraries already track
2 who checks out what books, what does RFID add that is a
3 privacy concern?

4 MR. TIEN: Well, the main one is if the RFID
5 tags are not secure, i.e., they are promiscuous, then
6 unlike a situation where only the library knows what the
7 book is, anyone with a compatible scanner or reader
8 would be able to get that information, and so the
9 audience for the information is no longer simply
10 internal to the library, but it could be anyone who can
11 read it, and you know, this is a concern not only
12 because of libraries themselves tagging but because the
13 publishing industry is looking into the use of RFID tags
14 for books generally.

15 So, you have sort of an issue of information and
16 materials that are very regulatory of what people are
17 thinking being capable of being associated covertly and
18 at a distance with their identities.

19 MR. GINSBURG: Thank you. For Peter, border
20 crossing, what would be tagged? Does this include
21 passports with RFID tags, and if yes, where are we now
22 with regards to RFID-enabled passports?

23 MR. SAND: My understanding is that it would
24 just be an additional step in the identification cards
25 that people currently use now. Right now, the actual

1 transaction is very manual, very kind of human-oriented,
2 and the idea would be to take information that already
3 exists and just facilitate that communication better.
4 It's already taking place now. It's just a question of
5 using technology to make it work a little faster, a
6 little better.

7 MR. GINSBURG: Thank you. I'm going to throw
8 out one of my zingers here. Britt, a fascinating pie
9 chart with the costs, you know, as you said, everybody
10 is so fixated on hardware costs, tag costs, reader costs
11 and all that, yet you listed 3 percent of the cost of
12 implementation as hardware, 73 percent software.

13 All right, simple math, using your sort of
14 average of tag costs, 30 cents a tag, someone has 50
15 million cases a year that they send to Wal-Mart, that's
16 a big number, and if that's 3 percent of the total
17 costs, this thing is going to be enormous.

18 So, how do we rationalize the ratios?

19 MR. WOOD: You rationalize the ratios based on
20 the fact that the percentage of software is based on the
21 life of the projeseu 19R ofhe rworkd, thi0costs, 30 cents a tag, s

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1 that have kind of talked about the fact that once we can
2 get the readers right and the chips to a basic level,
3 then it really is just kind of working with the software
4 and doing upgrades. So, in the lifetime of a project,
5 you will be looking at extensive costs in the software
6 side of the business. Up front, the costs really
7 resonate on the chip and hardware side.

8 MR. GINSBURG: Thank you, thank you.

9 Bill, one of the more sort of upstart, let's
10 call them pure play RFID companies that got a lot of
11 attention so far in relation to this CPG retail
12 phenomenon that's taking place now, more so than all the
13 other areas that you talked about, yet TI is still
14 beginning to write in a big way. What impact do you
15 think TI can have on this issue of cost? You're much
16 bigger than any of those other smaller companies that
17 are in here.

18 I know Philips was up here earlier, and we
19 should ask the same question of Philips, but
20 representing one of the big guys, what do you think we
21 can expect to see in terms of TI's impact on that
22 market?

23 MR. ALLEN: Well, thanks. As a chip
24 manufacturer and one of the major chip manufacturers in
25 the world, we already make billions of things per year,

1 and we are also working on expanded wafer technology,
2 going to a larger wafer in order to get yield higher,
3 and by doing a number of things like that, we feel like
4 and the math looks so far, it does look like we can
5 reduce costs down to a level where we can achieve that
6 Holy Grail that's always been there of a 5 cent tag, and
7 I think it's using economies of scale and, of course, as
8 volume ramps up, we can produce more, reduce prices, and
9 I am confident that we can deliver that.

10 MR. GINSBURG: So, of course, I have to ask the
11 follow-up question. When?

12 MR. ALLEN: When? Well, as soon as you guys
13 give us lots and lots of POs.

14 MR. GINSBURG: Okay, fair enough, fair enough.

15 Okay, Paul, back to you. How do you plan to
16 balance the FDA's refusal to create regulations on RFID,
17 per your final comment, and against your final comment
18 that the FDA will require manufacturers to only work
19 with wholesalers who use RFID?

20 MR. RUDOLF: Well, if I used the word "require,"
21 I misspoke. The FDA can't require that people do
22 business with each other, so if I said that, I
23 apologize.

24 What we've been doing is working with industry
25 to try and get industry to adopt internal good business

1 practices, and in fact, the Healthcare Distribution
2 Management Association has a set of business practices
3 that they have posted on their Web site for wholesalers.
4 A lot of manufacturers have adopted business practices
5 that limit sales to certain wholesalers that might use
6 certain criteria, and I think that's one of the things
7 that we'll at least discuss with various industry
8 participants, is how could that happen. We would not
9 require -- we can't require that.

1 MR. HARWOOD: Actually I meant the tags, but if
2 you want to address both of them, that would be good.
3 Actually, the readers, too, I meant the readers as well.

4 MR. FISHKIN: Well, okay. On the reader side,
5 as I showed, there are readers out there, you know,
6 today, pretty new on the market, but there are readers
7 today that are really very small. Like I said, there's
8 one from a company called Innovision which is basically
9 the size of a dime. Now, you have to add things to
10 that. You add the battery supply, you need to add the
11 wireless communication, you need to add the antenna, et
12 cetera, but still, the overall package, like I said,
13 today can really be pretty darn small, you know, they're
14 putting them in a Nokia cell phone. So, on that, I
15 think, you know, we're pretty much there.

16 On the tag front, again, even though I'm from
17 Intel, we're not making these chips, we're just buying
18 them from people like Bill, and the tags they have today
19 are kind of awkward. They're a bit big, but the vast
20 majority of the real estate is actually antenna. The
21 chip itself is really small. So, it really becomes a
22 function of sort of what read range you want, how robust
23 you want the reads to be, you know, so do you have to,
24 you know, hit it just right.

25 So, for example, in the anesthesiology thing

1 which we're doing now, and there again, we literally
2 wheeled an anesthesiology cart into our lab and started
3 tagging the stuff that they use today, and it's a
4 problem on some of the things, but not by much and not
5 by many. The best ones we have are actually -- in fact,
6 the best ones we have are ones from TI which are about
7 the size of a quarter, and then there are some from
8 Alien which are about the size of like a pinky finger,
9 and so it would be nice if they were smaller, but those
10 are good enough to get you most things.

11 The bigger issue we have is something that I
12 touched on briefly earlier, which -- in fact, this is
13 the exact type we use, thank you, so-called laundry
14 tags. The bigger issue is, at least in this
15 environment, we have a lot of stuff that's metal, and
16 these things really don't like being near metal, and
17 that's really a more severe problem, and that I think
18 would require more work.

19 MR. HARWOOD: Thank you.

20 Peter, does DHS intend to provide technology
21 companies liability protection with regards to privacy
22 matters similar to the Safety Act which protects
23 companies from legal liability for developing
24 technologies to combat terrorism?

25 MR. SAND: I have not been part of any

1 discussion about liability protection from DHS. I think
2 what's more likely is that there would be a long series
3 of open forums of discussion, so that people can put out
4 in public what they see the issues to be and then design
5 from the best ideas that come out of those discussions,
6 so that a lot of the issues are resolved ahead of time.
7 That I think would be the most efficient way to resolve
8 those kind of issues.

9 MR. GINSBURG: Maybe for Bill and Ken, is an
10 interconnected public network of readers truly possible
11 to read all RFID tags? How would you manage the
12 terabytes of data?

13 MR. FISHKIN: Well, how long do we have? Let me
14 get to the first part of that, and then actually people
15 like Jim Waldo would actually be much better to answer
16 the second part of that, and he's on a panel this
17 afternoon, so maybe I'll defer some of that.

18 Interoperability is a problem. There are
19 multiple frequencies which are mutually incompatible,
20 but it's getting better. The number of frequencies is
21 going down, particularly driven by people like Wal-Mart.
22 Standards are emerging, the EPC standards, things like
23 that. So, it's getting better.

24 There are readers, though, today that can read
25 two or three of these, which gets you most of them. So,

1 I think from sort of a technical engineering point of
2 view, it's doable, and it will become more doable within
3 a few years.

4 As far as the data access, I think I will
5 happily save that for maybe later in the day, unless,
6 Bill, you want to address that.

7 MR. ALLEN: Well, on the multi-protocol reader
8 side of things, when you put that requirement in,
9 performance is degraded, because it has to frequency-hop
10 and do a variety of different things. So, there's
11 tradeoffs for anything that you do no matter what
12 technology you're applying. If you want it to work
13 harder, performance will be degraded.

14 And then on the data side, yes, that's a very
15 daunting question, is what are we going to do with all
16 this data? And of course, a friend of mine who works as
17 an analyst in the retail sector did his own little
18 calculation one night when I guess he couldn't sleep and
19 wanted something to do to occupy his time, and so,
20 Simon, he calculated about how much data Wal-Mart would
21 generate in one day, and I don't remember all of the
22 details of it, but it was something like if you guys
23 read, you know, so many tags in so many stores, it would
24 generally 7.6 million terabytes of data per day.

25 Obviously that's a fairly daunting number, but

1 again, there will be solutions that come along, because,
2 you know, you can have a savant server that says, do I
3 need this data? No. Okay, I ignore it. Do I need this
4 data? No, I ignore it. Did something change? Yes, I
5 need this data. Therefore, I'll write that data. So,
6 there will be schemes that will be developed in order to
7 reduce the amount of data that is generated by RFID.

8 MR. GINSBURG: Simon, any thoughts on how much
9 data you're going to be --

10 MR. LANGFORD: I think the last comment there is
11 the crucial one, is keeping the data or acting on the
12 data that you need to, the fact that a tag may go past a
13 reader 30 or 40 times in this room, but I don't care
14 about that. What I care about is when it leaves the
15 distribution center and arrives in the store. We keep
16 all of the data now on movements of merchandise through
17 our supply chain. At least the RFID is plugging some of
18 those holes, or as I intimated earlier, knowing when a
19 case moves out to the sales floor, where is it? Is it
20 in the back room or the sales floor? So we can direct
21 associates to go and find that product in the back room.
22 So, it's just taking those extra read points and acting
23 upon that to help our associates serve our customers
24 better and more efficiently.

25 MR. GINSBURG: Well, while you've got the mike,

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1 to the customer, to the shelf, but no, there's no plans
2 to do that.

3 MR. WOOD: And I echo that sentiment. The
4 majority of the members who we've talked to who are
5 looking at this, that's really not a point of
6 discussion. It really is about the efficiencies that
7 Simon talked about that they really feel is the thrust
8 of this technology right now.

9 MR. GINSBURG: And the last one, Simon, is
10 recognizing that this is a long journey, all right, we
11 have to get to scale and critical mass to really get a
12 lot of the big benefits, can you describe when the --
13 not so much the benefits, but the profitability side of
14 it, when you expect to start to see that and when you
15 think that will be on the horizon for the suppliers?
16 Clearly day one, it won't be there, right?

17 MR. LANGFORD: In terms of our suppliers, and I
18 wouldn't want to speak for our suppliers, and every
19 supplier is configured differently in supply chain
20 makeup and the volume of products that they service and
21 the number of out-of-stocks that they may have. So,
22 we're trying to focus on things that deliver return not
23 only for Wal-Mart but directly to our suppliers as well,
24 and the biggest thing is the in-stock position and
25 increased sales that I mentioned.

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1 We would start to see that and start to change
2 processes in our stores and distribution centers from
3 January, to start to go down that path, and you're
4 right, we will hit a critical mass when that starts to
5 change.

6 And just to come back on one thing about the
7 cost of implementation and the cost of software, et
8 cetera, we've approached this in a very simple way, a
9 little bit like the data I mentioned and how we are
10 keeping that, which pieces to keep and which not, and
11 we're taking the stance that if we start it at a point
12 where we integrate the EPC and take that as though we're
13 reading a bar code, just that serialized number, what
14 kind of things can we do within the application to be
15 more efficient, and then that's our starting point.

16 We are not whooshing off to change our legacy
17 systems and all our applications. So, it's one byte at
18 a time, and we haven't increased our IT spend over and
19 above what we normally budget for year after year, and
20 that will continue, and this will just be another
21 initiative, similar to the bar code and other things
22 we've implemented, whether that be -- and so on and so
23 forth, that we will just have iterations through each
24 year and continue to improve.

25 MR. HARWOOD: All right, well, I think that's

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1 all the time we have for questions. I apologize if we
2 didn't get to all of them. We had a number of them that
3 were still in the pile here, but we simply didn't get to
4 them. I do apologize for that.

5 I would like to thank all the panelists, and I
6 hope you will join me in a round of applause for them.

7 (Applause.)

8 MR. HARWOOD: And next we have Commissioner
9 Thompson, who is with the Federal Trade Commission, and
10 maybe if the panelists would just stay up here, wait
11 here and we'll go ahead and facilitate things a little
12 bit, you will have an audience as well.

13 Commissioner Thompson has a few words for us
14 before our lunch break, and he's obviously a Federal
15 Trade Commissioner, has been at the FTC since --

16 COMMISSIONER THOMPSON: Forever.

17 MR. HARWOOD: -- forever, yes, well. It doesn't
18 seem like that long actually, but anyway.

19 REMARKS

20 COMMISSIONER THOMPSON: I hear the collective
21 growl of stomachs all through the room, so I should keep
22 it quick.

23 Well, good morning. Thank you all for being
24 here. I see a lot of familiar faces, and I'm happy to
25 see a range of people attending this conference, from

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1 industry, government and public interest groups, and I
2 appreciate you all being here to discuss this very
3 important issue.

4 Two areas to begin with, one is that my general
5 disclaimer, my words today are my own and not
6 necessarily those of the other Commissioners, and the
7 second is all of your tags have tracking devices. We'll
8 know where you're eating, and if you're not back here on
9 time, we will bar you from the room.

10 But today, we're here to talk about RFID, what
11 it is, how it can be used, what it means to business and
12 consumers alike. Now, I think our workshop today is an
13 interesting one and an important one because it
14 represents the first really broad-based conference on
15 the subject, and it will give us all an opportunity to

1 actually been around for quite some time. It's
2 currently in use in a variety of contexts. I just drove
3 back from New York last night with my E-ZPass, so
4 there's lots of examples.

5 We've also had a chance to learn a little bit
6 about the nuts and bolts, about how RF technology works,
7 starting with how the chips and the readers communicate,
8 and we've heard about what this technology can and
9 cannot do and a little bit about what its likely
10 economic impact will be.

11 Now, we also heard from experts who are
12 basically putting RFID to work in manufacturing plants,
13 in distribution centers, in the retail stores, medical
14 facilities, and in light of the breadth of potential
15 applications, it also should come as no surprise that it
16 poses a variety of privacy, security and other types of
17 questions.

18 So, having heard a little bit about the
19 potential benefits and risks of RFID, I'm especially
20 looking forward to this afternoon's discussion, which
21 will address a little bit more concretely how this
22 technology will affect consumers now and in their daily
23 lives in the future.

24 For example, streamlined supply chain management
25 can, of course, benefit consumers when they shop,

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1 creating more efficiencies and hopefully potentially
2 lowering prices. I like that.

3 But RFID may also benefit consumers more
4 directly if merchants move toward an item-level tagging
5 system, where consumers could buy things more quickly
6 and return them more easily and perhaps, more
7 importantly, recover them if they're stolen.

8 It also has some potential to have improved food
9 and product safety, but they all have questions, too,
10 these applications. Will such a system result in more
11 tracking of consumers? Will it facilitate their
12 profiling? Will it expose consumers to unwanted or
13 annoying corporate marketing? Of course, we know that
14 never happens, right?

15 Just what kind of data, how much will be
16 generated in a world where RFID is ubiquitous, and where
17 will this data go? All of these questions raise the
18 issue of what industry's responsibility will be, and of
19 course, what should be the Government's role?

20 This afternoon's panel, or perhaps more
21 accurately debate, on what the future will bring will
22 discuss this complicated and fascinating question.
23 Though I'm not sure of what this afternoon's
24 discussion's outcome will be, I am confident it will
25 take longer than today to find the answer or what the

1 appropriate balance will be.

2 But today, we have an opportunity to have a good
 3 start, so I hope we hear some creative approaches to
 4 addressing the challenges that we all see before us, and
 5 as we close the workshop, we'll have a chance to talk at
 6 least at the outset on what kind of best practices and
 7 principles might be helpful here, and during that
 8 discussion, we will hear from companies who have
 9 considered consumer privacy issues and have attempted to
 10 accommodate them in their RFID trials, and that's not
 11 just here, but also abroad as well. We'll also hear
 12 some privacy experts who have seen similar challenges
 13 and focus on translating industry efforts for meaningful
 14 choices for consumers.

15 Now, I know that none of these these these these these, and duh.

16 The challenges to a good

17 are the same as those that we face in other areas, and we need to focus on these these these these these, and duh.

1 how they can make meaningful choices in using new
2 technology. So, thank you very much for coming, and I
3 hope to see you after lunch, or I will go out and find
4 you. Thank you.

5 MR. HARWOOD: Thank you, Commissioner Thompson.

6 (Whereupon, at 12:00 p.m., a lunch recess was
7 taken.)

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AFTERNOON SESSION

(1:07 p.m.)

PANEL 3

MR. LIVINGSTON: Good afternoon and welcome back from lunch. My name is Ted Livingston. I'm a consultant who has been doing some work for the Commission in the area of emerging technologies and their impact on consumers and particularly consumer privacy.

My colleague as moderator on this panel is Ellen Finn, who is a staff attorney in the Division of Financial Practices here at the Commission.

Our topic is the implications of RFID use on consumers, and we're really in the next two hours going to try to focus on the consumer and probably not so much on the supply chain, which you heard quite a bit about this morning, and address the benefits to consumers of RFID technology and some of the concerns that consumers may have or maybe should have about the technology, particularly as it relates to privacy issues.

Our goal for this panel is to have it be as much of a dialogue as possible, and with that in mind, we've asked our panelists to limit their comments to five to eight minutes, and we're even calling them comments instead of presentations, so that hopefully we will be

1 able to finish that part of the panel in about an hour,
2 and then we hope to have a lively discussion and
3 question and answer period for the second hour.

4 With that in mind, as you know, we have these
5 question cards. If you can put which panelist or
6 panelists you would like the question addressed to, as I
7 think most of you did this morning, that would be
8 helpful, and what we're going to try to do is ask the
9 question of that panelist or panelists and then ask
10 anyone else among the people up here at the table as to
11 whether they would like to comment on that question as
12 well.

13 So, with that, I will turn it over to Ellen, who
14 is going to introduce our presenters.

1 Capgemini's Americas Region and member of the Group's
2 Office of the CTO. In 2004, he was named as co-chair of
3 the ITAA Committee on RFID and the chair of ITAA Task
4 Group on Public Policy Formulation for RFID, and he is
5 going to share some information about some research
6 CapGemini has done on RFID and his perceptions of it.

7 MR. PARKINSON: Great, thank you very much. I
8 do need to at least use some footnotes, because I'm a
9 consultant. That's what we do.

10 So, last year in October we with the National
11 Retail Federation (NRF) decided to try and get some
12 quantitative sense of where the consumer was with RFID,
13 and we did this via an internet panel, which I readily
14 admit already biases the sample, since if you can't get
15 onto the internet, you weren't reviewed for the
16 research, but we asked a fairly structured series of
17 questions about what people understood about RFID, what
18 their concerns were about it, and what they saw as the
19 potential benefits from it, and those results are
20 presented here very briefly.

21 There is a published report based on this that
22 was released jointly by Capgemini and the NRF, which is
23 available from either of our Web sites, or if you want
24 to see me afterwards, I'll be happy to send you a copy.

25 The first issue was, why should we worry about

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1 consumers? Almost all of our work today is with
2 manufacturers and the supply chain. The answer is
3 because at the end of every supply chain, there is a
4 consumer, and if the consumer doesn't understand the
5 benefits and the issues around the application of RFID,
6 then some of those benefits won't be realized, and
7 because we believe they are significant to everything up
8 to the consumer and potentially to the consumer as well,
9 we wanted to get a sense of where everybody's head was
10 around this.

11 This was coincident with the Wal-Mart
12 announcement that got some press release. It was after
13 a number of issues had been raised in the media around
14 the use of RFID tags, particularly post-sale
15 identification tags. So, it's very hard to judge what
16 people really get about this. So, this is why we did
17 the research.

18 So, what did we find? We found essentially that
19 most people have no idea what RFID is. Not a surprise.
20 It's another of those brand new 50-year-old technologies
21 which is about to roll out into some part of society.
22 So, only about a quarter of the people who were
23 interviewed had any idea.

24 Now, in the "no, we have no idea what it is,"
25 there were a significant number of people who routinely

1 use either a toll tag or Mobil Speed Pass, both of which
2 are RFID devices, and they had not associated their
3 routine use of those devices with the term RFID. In
4 fact, there were a number of comments that until it
5 showed up on TV, I think they quoted an episode of
6 Alias, they hadn't made the association between the
7 device and the concept.

8 Men are slightly more likely to have heard of it
9 than women, but not significantly, and people in the
10 survey got their information from all over the place.
11 There was no standard source to go to for reference
12 material.

13 So, we then said, okay, what do you think about
14 it? And slightly surprisingly -- two slightly
15 surprising things here. One is that most people, the
16 largest single group, had no opinion. So, the second
17 largest group were favorable, which is a broad spectrum
18 of response. Only 10 percent explicitly said that they
19 had an unfavorable view about RFID. So, this is in
20 contrast to some of the material you have seen in the

n hawer

13

2

So, we then said, okay, what do you think about

the

1 it would put the price of the goods they were buying
2 that were involved in RFID programs, the price would go
3 up.

4 Secondly, we asked them what they thought the
5 benefits would be, and again, slightly surprisingly,
6 there was a perception that -- again, I think because
7 people think about systems like LoJack, it would be
8 easier to recover stolen goods, and then there was a
9 view that there might be some decreased costs once the
10 supply chain impact had worked its way through, and
11 there was some perception that application to the

1 these questions. There was also some issues about
2 health, which we see show up every time, anything to do
3 with the electromagnetic spectrum it gets raised with,
4 it seems.

5 We asked if people felt that the RFID issue was
6 greater or less than other kinds of trackable devices or
7 trackable systems, and in general, we got a, yes, we
8 think it probably is pattern of response. Even people
9 who don't, again, necessarily fully understand the
10 technologies that lie behind some things like debit
11 credit cards felt that RFID would be worse than that.

12 What would you like us to do about it? Let's
13 get some legislation in place that at least tells us
14 what it is people are allowed to do. Let's look at the
15 viability of killing tags post-purchase. Let's look at
16 opt-in/opt-out systems, where at least you could tell
17 merchants whether or not you wanted tagged devices and
18 whether they wanted them killed. And let's at least put
19 a label on the goods and services that we buy that
20 clearly state whether they're tagged or not.

21 We asked people how long they thought RFID would
22 take to come into widespread use, and generally

1 However -- and again, slightly surprisingly -- a much
2 larger percentage said they would prefer that it didn't
3 happen. So, we probably need to go back and do another
4 survey to try and drill more deeply into why there's
5 that contrast between inevitability and desire, and we
6 have some plans to do that.

7 So, what did we conclude from that? Currently,
8 not many people really know about RFID, and even people
9 who do don't know very much about it. There's a growing
10 explicit interest and growing concerns around RFID --
11 not all that surprising -- that it would be better we
12 think to communicate more about the reality of RFID to
13 consumers now rather than waiting until it's a more
14 widespread phenomenon, and that education is the route
15 to the consumer mind set, in particular to re-assure
16 them around health issues, to explain that some of the
17 things that they worry about are things that the
18 industry dreams it could do -- nowhere near capable of
19 doing today -- and to help guide the legislative
20 efforts, because from our perspective as an industry, we
21 want to do the right thing to get the benefits from
22 RFID, but we can't yet tell what the right thing is.

23 The appropriate use guidelines, we would assert,
24 need to be built now so that by the time we have
25 capability, we know we're using it for the right things.

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1 Our concern is that if we as an industry don't do this,
2 then it's likely that other groups with other agendas
3 will.

4 So, what should we do? Let's look at the
5 sources of insecurity and figure out what we should do
6 about them. Let's as an industry at least get behind
7 the explicit marketing of goods that are tagged, try and
8 disconnect the technology, which is just a technology,
9 from the broader issue around privacy and the use and
10 potential misuse of consumer information and get clear
11 guidelines on appropriate use worked out, and then
12 publish and adhere to whatever those policy guidelines
13 might be.

14 We need to get moving on this, because the
15 mandate-driven market we have today is moving RFID along
16 much faster than most of us from a technical perspective
17 expected, and we do not want to lose the trust of the
18 consumer in this. We as an industry want to be sure
19 that the consumer knows what they're getting before tags
20 start showing up in places they don't expect.

21 Now, there's some clear benefit models
22 associated with this, and we'd like to explain those to
23 consumers and let them decide how much of those benefits
24 they want to pay for the price of the goods they buy at
25 retail.

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1 Thank you very much. I will be happy to answer
2 questions later.

3 Mallory?

4 MS. FINN: Thank you.

5 Our next speaker is going to be Mallory Duncan.
6 He has served as Senior Vice President and General
7 Counsel for the National Retail Federation for the past
8 ten years, and he's responsible for coordinating
9 strategic, legislative and regulatory initiatives
10 involving customer data privacy, financial services and
11 consumer protection.

12 MR. DUNCAN: Okay, thank you and good afternoon.

13 By way of background, the NRF, who worked with
14 Capgemini on the study, is the world's largest retail
15 trade association. Our membership consists of all
16 formats of retailers. We cover household names, from
17 Saks to Sears, all formats, from a local haberdasher to

1 achieve significance is dependent upon the handling of
2 four other issues related to it: Education, notice,
3 choice and value.

4 Let me start with just a few observations. One,
5 individuals are notoriously bad at assessing the
6 economic value of a new concept in the abstract.

7 Second, for many, uncertainty is frightening.
8 Confronted with the unknown, they tend to fall back on
9 re-assurances, family, home, hearth protection.

10 Three, in the period before society has an
11 opportunity to comprehend, experience and reach
12 consensual accommodation, new technology is often
13 characterized as creating unwarranted privacy
14 intrusions.

15 Now, use of RFID technology in retail stores is
16 still in its earliest stages. As the study indicates,
17 most consumers have not heard of the technology, and
18 those who have, reactions appear to reflect these three
19 observations.

20 For example, on the positive side, given its
21 newness, it's not entirely surprising that consumers
22 value highly the potential for the technology to satisfy
23 safety and security concerns, recovery of stolen items,
24 antitheft capabilities, prescription drug security, et
25 cetera, and frankly, inasmuch as society still places

1 the bulk of the nurturing burden on mom, these same
2 family safety potentials might explain why the study
3 found that women tended to rate the benefits of RFID
4 slightly higher than men.

5 Now, improvements such as fewer out of stock,
6 faster checkouts, were likely ranked lower than
7 anticipated in the study, because consumers have not yet
8 experienced the world in which those things happen;
9 thus, it's difficult to appreciate their value.

10 Similarly, consumers say they're unwilling to
11 pay extra for service they can't now imagine. Two
12 decades ago, if you had wanted to ask consumers how much
13 they would have been willing to pay for a telephone they
14 could remove freely from the wall, it's likely most
15 would have said little or nothing. It's virtually
16 certain they would not have given a figure comparable to
17 the \$69 per month many cell phone users now pay for that
18 extra service.

19 As to privacy, privacy-related questions scored
20 high in both the unaided and preprogrammed responses to
21 the study, again, not entirely surprising. When new
22 technology expands sensory reach, it inevitably reaches
23 previously ingrained expectations. Individuals react to
24 change as a privacy violation. Eventually an
25 accommodation is reached, from which arise new

1 expectations.

2 The internet, email within it, cell phones, are
3 all undergoing that process right now. The most famous
4 law review article, "Eliminating the Right of Privacy,"
5 published near the turn of the prior century, was
6 written in response to that era's cutting edge
7 technology, telephoto lenses.

8 Now, let me suggest a proposition. Unless we
9 are aiming to arrest potential benefits, we shouldn't
10 write laws in response to imagined difficulties.
11 Currently, virtually everything about the future of RFID
12 is unsure. We need to see what uses develop, whether
13 where the technology is used in practice falls within or
14 outside of our comfort zones, before we can regulate its
15 use.

16 An early law prohibiting the photographing of
17 strangers might have stopped peeping toms and killed
18 most photo-journalists. A law making it illegal to
19 telephone unknown persons would have curtailed some
20 telemarketing, but it would have effectively prohibited
21 nationwide public opinion polling and the 911 system.

22 As technology evolves and technology passes, one
23 can anticipate a more realistic balance between consumer
24 benefits and concerns. Regulations should be considered
25 only if evolving technology use practices fail to meet

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1 consumer expectations.

2 NRF believes that the privacy policy
3 recommendations that our board adopted are applicable
4 here. Our policy recognizes that in a highly
5 competitive retail marketplace, maintaining the trust of
6 one's customers is essential. There may be millions of
7 retail outlets, but in the real world, customers shop at
8 a fraction of 1 percent. For most retailers, repeat
9 business is essential. If a dissatisfied customer walks
10 to another store down the mall, the retailer hasn't lost
11 a sale; he's lost dozens of sales or perhaps scores of
12 dozens of sales.

13 As applied to RFID, that means that there's a
14 need for education. It's important that consumers learn
15 the RFID basics, its uses in EPC, and receive a
16 realistic expectation of its potential.

1 receive marketing solicitations or have their
2 information for marketing purposes sent to a third
3 person. In some cases, the option, however, would be to
4 choose another retailer.

5 Information received by a retailer should be
6 subject to reasonable and responsive security and access
7 provisions, and the entire process should be managed
8 with an eye towards value for the consumer. A more
9 cost-effective supply chain is one such value.

10 As the caption on our research demonstrates,
11 consumers will need to see the benefits of deployment in
12 order to fully appreciate its value. The concept of a
13 Blackberry is not nearly as appreciated as its value.

14 The potential for overly harsh regulation of new
15 technology is a constant threat. The values of RFID and
16 EPC will only be realized if retailers act thoughtfully,
17 carefully and adhere to the simple principles that have
18 always been at the heart of building customer trust.

19 Thank you.

20 MS. FINN: Thank you.

21 The next speaker we are going to hear from is
22 Beth Givens, who is a familiar face to many people in
23 this room. Beth is the Founder and Director of the
24 Privacy Rights Clearinghouse. Established in 1992, the
25 PRC is a nonprofit consumer education, research and

1 advocacy research organization located in San Diego.

2 MS. GIVENS: Thank you, and thank you for the
3 opportunity to speak here today and to participate.

4 Just a couple of words about the Privacy Rights
5 Clearinghouse, because it will help explain some of the
6 comments I want to make later, we interact directly with
7 individuals. We invite their calls and their emails,
8 and we're kind of the Dear Abby of privacy. We have
9 been doing this now for a dozen years, and quite
10 frankly, we have heard just about everything, although I
11 continue to be amazed and curious about what we do learn
12 about from individuals who are experiencing privacy
13 abuses and problems in the marketplace.

14 What I wanted to talk about today are four
15 things. I'll first summarize the characteristics of
16 RFID that could threaten privacy and civil liberties,
17 and that will be the focus of my talk. I will follow by
18 critiquing some of the technology-based proposals for
19 mitigating these privacy concerns. Then I'll say a few
20 words about consumer education, something that I think
21 we'll be hearing a lot about today and in the near
22 future. And I'll close by calling for a comprehensive
23 multi-disciplinary technology assessment of RFID.

24 So, to begin, industry representatives have
25 described many benefits of RFID today, but RFID is a

1 classic information technology in that there is a
2 potential downside as well. If the technology is
3 implemented irresponsibly, we as a society could
4 experience it not as a wonderful convenience with many
5 social benefits, but rather, as a tool for consumer
6 profiling and tracking. In other words, as one part of
7 a larger surveillance infrastructure. So, the key
8 question is, how do we shape the implementation to
9 ensure the socially beneficial aspects and to prevent
10 the negative ones?

11 Just to summarize, RFID has several qualities
12 that working together could threaten privacy and civil
13 liberties, and these are, first, the bit capacity of the
14 tags sufficient to uniquely identify all objects on the
15 globe; second, the fact that tags and readers can be
16 installed invisibly, enabling tags to be read from a
17 distance without the individual's knowledge and consent;
18 and third, the database, something that we have really
19 not talked about enough I think, the databases that are
20 developed to compile, store and analyze that vast amount
21 of data gathered as those products make their way from
22 the factory to the point of sale and perhaps beyond.

23 Now, it's the "beyond" that is of concern to
24 privacy and civil liberty advocates. That's where the
25 item-level data on the tag could be combined with

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1 personally identifiable information, at least at the
2 database level. So, put these qualities together, and
3 yes, there is potential to create a comprehensive
4 infrastructure for individual tracking and profiling,
5 something that we want to, of course, avoid.

6 A variety of technology-based fixes have been

1 have working tags on them. While some might think that
2 this is unlikely and that the retail industry would not
3 do this, we only have to look at the present day
4 situation around product returns to realize that it's
5 really not out of the picture.

6 I mentioned that we have been talking with
7 consumers for a dozen years now. Consistently, year
8 after year, in the top ten of our complaints are
9 complaints about merchants who require individuals, when
10 returning items with a receipt in hand, to provide name,
11 address and driver's license number. Other7,5se,the

1 consumer education as an important way to mitigate
2 consumers' concerns and to instruct individuals on the
3 choices that they have to protect their privacy. As a
4 consumer educator, I take this recommendation very
5 seriously. It strikes very close to home, and I think
6 it's very important to differentiate between a true
7 consumer education campaign and a public relations
8 campaign. There's a big difference between the two of
9 them, and let me give you one example of a consumer
10 education campaign that I was involved in many years
11 ago.

12 In 1996, we at the Privacy Rights Clearinghouse
13 participated in a comprehensive consumer ed campaign
14 revolving around Caller-ID in California. The message
15 of consumer choice revolving around which blocking
16 option, a comprehensive blocking or selective blocking
17 of your phone number as it goes out over the wires, was
18 basically the message that needed to be transmitted to
19 Californians.

20 So, the message was developed by a committee
21 that was comprised of representatives of all
22 stakeholders, the phone industry, the regulators and the
23 consumer advocates, and that message was not finalized
24 until we could all agree upon it, and that message was
25 ultimately conveyed by multiple media, TV, radio,

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1 newspapers, and in many languages.

2 By the time the Caller-ID was launched, a survey
3 was done, and it showed that two-thirds of consumers
4 were aware of their choices, and the effort was guided
5 by an academician, who was a communications scholar from
6 Ohio State University, and her expertise was in the area
7 of public information campaigns. So, that is what I
8 would call a consumer education campaign.

9 In convincing with the consumer ad initiative
10 for RFID, I strongly recommend the development of
11 strategies borrowed from such efforts as I just
12 explained.

13 Now, last November, 50 consumer, privacy and
14 civil liberties advocates got together and released a
15 position statement on RFID. That was led by CASPIAN,
16 the Privacy Rights Clearinghouse, along with EPIC, EFF,
17 the ACLU and others. You can find that statement on our
18 Web site, privacyrights.org, as well as several other
19 Web sites.

20 We call for the implementation of RFID to be
21 guided by the Fair Information Principles, something I
22 will not talk about now because it will be discussed
23 later, but what I do want to spend just a few moments on
24 is what we called for, which was a comprehensive
25 technology assessment to be conducted by an impartial

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1 body or group of impartial bodies, akin to the type of
2 assessments done by the Congressional Office of
3 Technology Assessment that existed from '72 to '95.

4 Even though industry is moving full speed ahead
5 with RFID, I continue to believe that such an assessment
6 is vitally important for the responsible implementation
7 of the technology. Ideally it would consist of a
8 multi-disciplinary analysis covering the expected
9 benefits as well as the expected adverse impacts. It
10 would include not only privacy and civil liberties, but
11 also labor impacts, which I think are going to be huge,
12 environmental health implications, and of course, what
13 we're talking about here today, which is privacy.

14 It would be overseen by an impartial body,
15 perhaps a body like the Federal Trade Commission, the
16 National Academy of Sciences, an academic institution or
17 perhaps working together as a consortium, but
18 "impartial" I think is the key word.

19 Just let me throw out two or three questions
20 that could be addressed by a technology assessment. One
21 would be what would be some of the unintended
22 consequences, something we oftentimes learn way too
23 late.

24 Second would be are there other technologies
25 that could do some of the same things but are less

1 intrusive, and I think Intel brought that up today with
2 the discussion of 2D bar codes.

3 Then third, do we need to have all of these
4 items in the world uniquely identified? Could radio
5 frequency identification work well with just a bar code
6 level being emitted, generic information? For example,
7 bringing your computer to the landfill. It doesn't have
8 to say, "Lead inside, and this lead belongs to a
9 computer that was paid for by Beth Givens in August 1983
10 purchased at Circuit City." It could just simply say
11 "lead inside" or "mercury inside" or "nickel cadmium
12 inside." So, there could be an RFID implementation that
13 is not quite so intrusive as the EPC.

14 One of the aspects of Congress' technology
15 assessment that I liked the best was that it came up
16 with not one policy solution but several, so that
17 lawmakers, industry and others could see different
18 scenarios based on, say, low regulatory environment,
19 moderate or high.

20 In closing, I strongly recommend that the FTC or
21 perhaps the National Academy of Sciences, a scientific
22 or academic institution or even a consortium approach
23 take this approach. Now, we've already got several
24 pieces of a technology assessment in the works,
25 industry, some academic institutions, consumers groups.

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1 I think we have a good start, but we need that impartial
2 look at this technology.

3 With that in mind, I close with a quote from
4 Senator Patrick Leahy, and I think he wraps everything
5 up that I said quite nicely in one sentence. He said,
6 "We need clear communications about the goals, plans and
7 uses of the technology so that we can think in advance
8 about the best ways to encourage innovation while
9 conserving the public's right to privacy." He said that
10 in March of 2004.

11 Once again, thank you for the ability to
12 participate today, and I'll look forward to the
13 questions and discussion.

14 MS. FINN: Thank you, Beth.

15 The next person who will speak is Deirdre
16 Mulligan. Deirdre is Acting Clinical Professor and
17 Director of the Samuelson Law, Technology and Public
18 Policy Clinic at the Boalt School of Law at the
19 University of California, Berkeley, and she came to
20 Boalt from the Center for Democracy and Technology,
21 where she worked on privacy and free speech issues.

22 MS. MULLIGAN: Thank you. It's a pleasure to be
23 here this afternoon.

24 I run a clinic, as she mentioned, which is kind
25 of the lab component of law school, and so students both

1 from our computer science, information sciences and from
2 the law school work with me on different kinds of
3 projects. Some of them might be actual litigation or
4 legislative activity, and some of them are more
5 research-oriented.

6 We have been engaged in a variety of
7 research-oriented activities around RFID and more
8 broadly what we call pervasive computing. I believe Ken
9 Fishkin mentioned kind of pervasive computing. We've
10 heard sensor networks thrown out. So, the notion that
11 computers are going to be embedded into our physical
12 environment in so many ways, in the virtual world, where
13 people are concerned about cookies and people tracking
14 what they do online all of a sudden meets the physical
15 learn, where the kind of tracking that we've only
16 imagined occurring online is now embedded in the world
17 around us. So, they're not tracking your clicks;
18 they're now tracking where we go.

19 I think Ken Fishkin had some really elegant
20 examples of the kind of neat things we can do, the
21 invisible man or the invisible woman, you might say, but
22 there are also some real privacy concerns.

23 I remember being here in 19 -- I don't know,
24 maybe '95 and then Chairman Pitofsky talking about they
25 don't only know online that I chose the salmon, they

1 know that I considered the beef, right, and so there is
2 an awful lot that we can infer from the use of this
3 information.

4 We have been particularly focused on a very
5 special kind of good, and that good is information
6 goods. Information goods, books, CDs, DVDs, all that
7 intellectual property that we hear about, they play a
8 very special role in our society, right? We have
9 protections stemming from the First Amendment and the
10 Fourth Amendment that protect governments from trying to
11 get a hold of it. It is what we're reading right, as
11 elsewhere it's limiting governments access to records that

1 they entered the great marketplace of ideas.

2 So, people often talk about privacy law being
3 very patchwork and unsystematic, and in fact, when we
4 talk about information goods, Congress has stepped in
5 pretty frequently, and there is the Bork -- during
6 Bork's confirmation hearings, people may remember this,
7 an enterprising reporter at The City Paper here in D.C.
8 got hold of Judge Bork's video rental list and said, oh,
9 nothing interesting, but people on the Hill said, oh,
10 could have been something interesting, right, so we have
11 the Video Privacy Protection Act passed which provides a
12 protection for our private viewing habits. We have
13 rules that protect cable viewing.

14 At the state level, dealing with libraries, I
15 think it's 48 states -- and there's probably a librarian
16 in the room who will correct me -- but I think it's 48
17 states have state legislative protection around
18 librarying of patron records. So, we have a very rich
19 culture of protecting the privacy of our freedom of
20 inquiry, what it is that we're accessing.

21 The good news is information goods providers
22 generally are into this culture of confidentiality,
23 right? So, book stores oppose subpoenas that are
24 overbroad that they think are inappropriate. Libraries
25 have very strong kind of, you know, their Constitutional

1 kind of principles that protect privacy.

2 So, what does this have to do with RFID? It was
3 mentioned earlier that libraries are implementing RFID
4 systems. There's been a lot of focus on libraries. I
5 think it's good to kind of step back, and libraries, as
6 I said, have this very strong culture backed by state
7 law of confidentiality protections. Most of the other
8 retailers that deal with books do not, right, and so
9 certainly many of them step up to the plate in the
10 context of books and protect privacy when a government
11 subpoena or private subpoena might come around.

12 When we talk about introducing something like
13 RFID into the mix, it gets a little bit more
14 complicated. So, we have some threats that I think are
15 important to think about.

16 RFID, as I mentioned, it works on a broadcast,
17 right, so my RFID tag is talking to everybody, this word
18 promiscuous, which I have a really good slide in ceT† al c pr
mut.

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1 point, all right, so we can track as an individual moves
2 potentially, but I think also, interestingly, we can
3 track as a good moves. So, if I know that Deirdre
4 purchased a particular book, we can now figure out who
5 it is that Deirdre is lending things to, or if we've
6 decided that a given person who we've decided is suspect
7 has a certain kind of good, we can look for other people
8 who might have that kind of good, and when that good
9 happens to be a book or something that is about our
10 inquiry, I think that that kind of tracking raises
11 particularly, you know, troublesome concerns.

12 Beth mentioned the invisibility of the tags and
13 readers. We've talked a little bit about joining data.
14 I want to look a little bit -- there are some real
15 important differences between the RFID technologies
16 being deployed in libraries and the RFID technology that
17 we're talking about, primarily EPC standard, in the
18 general commercial space.

19 Libraries, as I mentioned before, you know, they
20 really live and breathe privacy. Many of you are
21 probably familiar with the whole debacle around Section
22 215 of the Privacy Act. Libraries are very, very
23 concerned about Attorney General Ashcroft coming in with
24 subpoenas that they can't talk about for people's
25 borrowing records.

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1 So, if you look at -- the most important
2 differences here, the read range, right, library read
3 ranges for the little tags that we have are one to four
4 feet, pretty close proximity, versus the EPC tags, 20 to
5 30 feet, you know, depending on the environment. The
6 labeling protocols, in the library setting, there isn't
7 a standard, and there's not a standard for the
8 technology. There's a bunch of different standards that
9 are out there, and some of them are proprietary and not
10 really standards, and there's also no labeling protocol.
11 So, libraries are doing different things. They tend to
12 be library-specific. So, it's much more difficult to
13 correlate, well, you're borrowing this book, and so this
14 book over here that has the same identifier must be the
15 same book. It doesn't really work that way in a library
16 setting.

17 In EPC, with this 96-bit globally unique ID, you
18 will see we have a slightly different picture
19 potentially. So, here are the two books, and I love --
20 these are my promiscuous tags -- I'm sorry, I just had
21 to do that -- so, in the EPC version, the tag might
22 actually be saying something like, you know, this is a
23 Penguin Publisher, it's Catcher in the Rye, and this is
24 copy 51034. Now, if that, in fact, is what's being
25 broadcast, I think many people would find that quite out

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1 of sync with their own expectations of, you know, who's
2 going to have access to what they read. In the library
3 setting, it's more likely to be this string that doesn't
4 necessarily add up to anything much.

5 Now, we've had a little bit of a conversation
6 about the back-end databases. Part of that depends upon
7 what this tag points to and what kind of access controls
8 are on that tag. Somebody stated earlier, I think it
9 was the first -- Sue Hutchinson, I think was her name, a
10 woman who spoke early this morning -- and she said that
11 all of these servers are sitting behind firewalls at
12 companies, and I actually don't think that's going to be
13 the case. I think that there are going to be all
14 different kinds of servers.

15 Many of you are probably familiar with the
16 internet movie database where you can go and look up a
17 movie. You can certainly go in some libraries and using
18 the ISDN number get to a book, right? So, you can use a
19 number to look up the content. We are all very familiar
20 with reverse lookups with phone numbers. It used to be
21 I could only look Beth up by her name, now I can look
22 her up by her number and get her name. And here, too,
23 depending upon the availability of the databases and
24 what kind of access we have to them and how centralized
25 they are and what their rules are, we can have very

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1 different things coming out of both of these contexts.

2 So, I am going to end with some conclusions,
3 solutions and recommendations. I think that, you know,
4 with respect to information goods in particular, RFID do
5 pose a substantial privacy risk, and what's important I
6 think from the FTC's perspective is that I think it does
7 violate established public policy. I think people have
8 very deeply ingrained, legally protected in some
9 instances, collectively shared expectations that the
10 books that they borrow, the books that they purchase,
11 the movies they watch in their house, that there is some
12 privacy protections that people aren't able -- you know,
13 I take the book, I buy it, I put it in the bag. I don't
14 want the book talking to other people and telling people
15 what I'm reading. If we don't think about that when
16 we're deploying the technology, there's a potential to
17 run right into those in a way that I think people would
18 really find very unfair.

19 Many of the solutions that have come out are
20 either inadequate or they're not particularly useful in
21 the context of information goods. Information good
22 markets are different. They don't tend to be like the
23 sweater that I buy and eventually it falls apart and I
24 ditch, right, or it ends up in the -- books tend to
25 revolve in the marketplace. We have many lending

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1 institutions, not just libraries, but video rental, you
2 know, we have much more of a culture of exchange, and
3 people also tend to collect and archive.

4 If you remember the CueCat device, which was
5 sent out -- I don't remember which business introduced
6 it into the market, but you could take it and we were
7 all supposed to get our magazine, wave the little CueCat
8 and be linked to a Web site that was going to market to
9 us, and some good engineers decided to hack into it,
10 reverse it and use it to catalog their CDs and catalog
11 other things that had these little bar codes on them.
12 And consumers are very interested.

13 There's a whole bunch of software programs out
14 there, all different kinds of things that help us
15 archive our collections. So, I actually think that
16 there are some interesting consumer end uses for RFID,
17 but I certainly know that to the extent that we have a
18 revolving market, we have book stores that are both new
19 and used, we have people who rout f,ues6feg5lslketve a
cnl- but I certain2,koving mayaonly ifd, we o96elslketve a
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1 that now, and I think that it would be really nice to
2 have a formal process rather than the ad hoc process
3 that we have going on in various areas.

4 I do think that it's really important when we're
5 looking at technology not to say, oh, any law is bad.
6 In fact, I think RFID, and there's been a host of other
7 technologies, we've actually shied away from some of the
8 more interesting potentially innovative uses, because
9 researchers get anxious because, oh, when we're dealing
10 with people, we have these privacy concerns. Let's
11 track the trees. Let's look at the ducks. Let's stie acng

1 The next person who we'll hear from is Dan
2 White. Dan has one of the more interesting job titles I
3 think I have ever encountered. He is a technical
4 evangelist, RFID, in technology for NCR's Corporation's
5 Retail Solutions Division. Dan's responsible for
6 evaluating RFID and other new technologies, determining
7 potential applications in the retail industry and
8 formulating strategic direction relating to these
9 technologies.

10 MR. WHITE: Well, as I've been sitting here
11 listening, I was thinking as a consumer, why would I
12 want RFID? What is the benefit to me personally? As I
13 look at it and I think about what might be going on in
14 the future, to get to the most basic level, RFID lets
15 you find things. So, I think about five years from now,
16 I might be sitting behind the TV looking at late night
17 TV and see an infomercial saying, buy this RFID tracker,
18 it will help you find your keys, it will help you find
19 the remote control that you're missing. It might even
20 help my wife keep track of the tools that she borrowed
21 so that I can find them after she borrows them.

22 As I was growing up, one of the things that
23 always amazed me was my mother, and she always bought
24 things on sale. Whether or not we needed them or not,
25 she bought them. In fact, one time she bought five

1 boxes of corn flakes, and so we ate corn flakes for
2 seven days for breakfast, lunch and dinner, and as I was
3 thinking about the things she used to do, oaoTnetthe
4 things she did was after Valentine's Day, she would buy
5 candy, and she would buy it for, you know, Easter or
6 Christmas. So, I don't know why as a child I always
7 wondered why the Easter bunny, you know, left me
8 Valentine's candy, but she did it because it was on
9 sale.

10 The problem came about was we never had enough
11 storage. So, she would end up hiding things. Number
12 oao, she hid them so we wouldn't find it, but the other
13 reason was so that she could actually get to it when she
14 needed to. Inadvertently she would forget when she hid
15 them, and yes, oaoTChristmas, I had Valentine's candy,
16 and we weren't sure which year it was from, so I still
17 check things when I go home and make sure the expiration
18 date's not goao, because she does seem to hide things.
19 So, whether it's something you've hidden in your home or
20 something that you may have lost, RFID in the future may
21 allow you as a consumer to be able to actually find
22 things that you're looking for.

23 If you take that concept into the store, and a
24 lot netthat's been mentioaod this morning, finding
25 things in the store is very critical. You may go

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1 shopping in a clothing store, and how many times are
2 things put in the wrong place? Being able to know where
3 it is at any one time in the store is powerful for the
4 retailer. It's powerful to let them know exactly where
5 it is at any one time.

6 If they're out of stock, like they've been
7 talking about this morning, they can go get more and
8 refill it, because the key thing in retail is if you
9 can't find it, you can't sell it, and from a consumer
10 standpoint, if we can't find it, we're not going to buy
11 it. That's why this is such an important technology to
12 the retailers.

13 If they're able to find it not only in the store
14 but all the way up the supply chain, you can imagine a
15 few years from now, you'd be able to ng ny where

1 if you look at the supply chain, it makes them more
2 efficient, and it means they can reduce their inventory.
3 All of these things ultimately will lower their costs.
4 It's not near term, it may be 10 years, may be 15 years
5 from now, but their lower costs will be passed on to the
6 consumer. So, from a consumer benefit standpoint, we're
7 going to be able to find things better, and we're going
8 to lower our costs. Those are some of the key benefits.

9 I think there's a lot of valid points that have
10 been brought about today, and as we start looking at
11 them and start having discussions about what are the
12 issues, I think we need to be very honest and open.
13 Some of the policies that have been put in place are
14 providing information in an open manner. We don't need
15 to hide anything. We need to say exactly what the
16 technology can do, and instead of being PR, we should be
17 also telling what some of the concerns are, and let the
18 consumer decide.

19 I think ultimately, the best benefit the
20 consumer can have is have the ultimate decision in
21 knowing what they want to do with the technology.

22 Thank you.

23 MS.ellingG NN ThanHfo d(23We'wer h Itsumer

1 Gamble Company. She also founded the Council of CPOs
2 for RFID Electronic Product Code Pricing Implementation,
3 and she's a member of the Public Policy Steering
4 Committee of the EPCglobal, and she's been active in
5 creating guidelines and is a speaker on the use of
6 item-level tagging.

7 MS. HUGHES: Thank you, Ellen, and thank you for
8 the opportunity to be here.

9 I hope some of you are familiar with Procter &
10 Gamble brands. We have over 300 in 160 countries around
11 the world, and we have 13 that have over a billion
12 dollars in sales each. So, if you look at this picture,
13 hopefully you use some of those. Can you tell me which
14 one is missing? It's the one that's out of stock 8 to
15 12 percent of the time.

16 For us, we are interested in EPC, as you've
17 heard, because for us, it's about putting the right
18 product in the right place at the right time and at the
19 right price. For us at Procter & Gamble, the consumer
20 is boss. That's a mantra that we carry throughout all
21 of our interactions, in everything that we do and what
22 we create, and the potential we feel for EPC is
23 throughout the entire supply chain, between us and our
24 suppliers, through the retailers, to the consumers,
25 through managing inventory, preventing theft and

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1 counterfeiting and reducing out-of-stocks.

2 Now, at Procter & Gamble, we are focused on the
3 supply chain. We haven't even begun to think about
4 what's going to happen post-sale for item levels that
5 leave the store, and for us, what's important, though,
6 is the way the consumer is feeling, because as I
7 mentioned before, the consumer's boss, and the way that
8 we manage the first moment of truth, what they see on
9 the shelf, really impacts whether they pick us up, they
10 continue with us, and continue as loyal consumers.

11 We have plenty of issues and things before we
12 are able to adopt EPC throughout our company. We are a
13 global company, and therefore, every solution that comes
14 up has to be a global solution, and this means across
15 all product categories and across all countries. In
16 technology testing, for example, we've heard about some
17 of the limitations when you think about liquids and

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1 conveyor belt, also on pallets, but when you get to
2 mixed cases on a pallet, we have a long way to go there,
3 and the cost is really important. If you think about a
4 99 cent can of Pringles and then putting that in a case,
5 when you get to some of the prices that we've seen for
6 tags in that whole process, it gets to be something that
7 we have a lot to work on.

8 The supply chain and internal adoption, within
9 our own four walls, we have incremental benefits,
10 because the state of our computer systems are pretty
11 efficient as they are. So, this requires collaboration
12 throughout the entire supply chain with retailers for us
13 to realize any additional benefits, and that means with
14 all retailers. We don't want to have a set of standards
15 and ways of doing things for one retailer versus another
16 retailer or in one country versus another country. So,
17 for us, being a global company with global processes, we
18 need a global solution, which brings us to the
19 standards.

20 We have heard some of the difficulties in, you
21 know, different countries, standards on spectrum, on,
22 you know, how the actual coding is done on the tags. We
23 are working very closely with EPCglobal on a number of
24 different task forces to come up with standards that
25 work across the whole broad range of issues for us. To

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1 have some products with EPC tags and some that are not
2 and different standards is just not cost-efficient for
3 us.

4 And then finally, public understanding. Even
5 though we are focused on the supply chain, we realize
6 from all of the research and some of the media articles
7 and the things from our own hands-on studies that show
8 that RFID is a concern to consumers. As I mentioned,
9 this is very important to us, and balancing the benefits
10 that they will get with solutions for privacy, health
11 and safety, et cetera, is really important to us. I
12 think the solutions are really going to be a combination
13 of technology, business processes, guidelines,
14 accountability, and we've been able to do that with our
15 consumer marketing.

16 Let me talk to you a little bit about our Global
17 Privacy Program. Our objective is to create an
18 environment of trust and confidence where consumers or
19 anyone that we do business with or collect personal
20 information from will willingly share their information
21 so we can better meet their needs. And if we want to
22 delight the consumer and have them be our boss, they
23 need to tell us what they want. So, we need to develop
24 that level of trust.

25 We have a global principle that we will treat an

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1 individual's information that they give to us as if it
2 were our own. We follow the fair information practices
3 of notice, choice, security, access, children, et
4 cetera, everything across the board in all countries,
5 whether there is legislation or not, and we also do it
6 across all media, so whether it's online, offline,
7 wireless and now RFID, and that is for across all
8 constituencies, whether it is consumers, consumer
9 marketing, consumer contact centers, employees,
10 shareholders, recruiting, et cetera, same principles,
11 same objective around the world. So, we need global
12 solutions.

13 Some of the successes we've had in this consumer
14 trust is that we have recently been voted by consumers,
15 over 6000 in the United States, as being the number one
16 consumer products company for ensuring consumer trust
17 and privacy. We were number three overall, behind ebay
18 and American Express.

19 The other thing is that a lot of people feel
20 that privacy policies and statements are not read on Web
21 sites and online. We have found this not to be true.
22 Over 4 percent of the hits to our pg.com are to our
23 privacy statement.

24 We are a permission-based marketing company, and
25 therefore, any further communication that we would have

1 with a consumer is an opt-in basis. We have over 2
2 million subscribers who are providing their information
3 about their children to our Pampers newsletter so that
4 we can follow the development of their children.

5 A similar situation with our homemadesimple.com,
6 which is a program for making your work life balance
7 more efficient, where you share information with us and
8 we're able to provide products and services and tips for
9 you. We have less than 1 percent who opt out. So, we
10 have seen a number of successes, and I feel this will
11 happen with RFID as well as just a new technology to
12 consider for privacy.

13 How does that come together? We have on our
14 company Web site a privacy page where you can see our
15 policy, our privacy statement. We do have a short
16 notice up there, so you can go out and see it at a
17 glance under Policy.

18 We also have a position statement on electronic
19 product coding that says that we require notice whenever
20 tags are being used, choices for consumers, education,
21 and if there is any retailer or partner that we're
22 working with that would be using personal information
23 together with tags other than they do for bar codes
24 today, then we simply won't work with them if there is
25 going to be any type of item-level testing.

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1 We also have education, as we talked about,
2 which is very important for consumers, privacy news, and
3 the last thing is where we are actually testing the
4 technology. As I mentioned, it's pallet and case, but
5 in the example of the Wal-Mart test, where there is even
6 the potential chance that there could be a case that
7 would be on the floor, even though it shouldn't be, that
8 a consumer could buy, we have even gone to the extent of
9 labeling all cases, whether it ce, that

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1 you for having me here today.

2 I thought it would be a good opportunity now at
 3 the end of this session for me to wrap up with a couple
 4 of observations, both about the promises and about the
 5 concerns for RFID. We've heard a lot of both, and I
 6 think we're here at the ideal setting to the consumer
 7 for both, because what we are talking about as far as
 8 the promises are concerned is whether the marketplace is
 9 going to accept RFID, whether the marketplace is going
 10 to acknowledge that the benefits of RFID outweigh the
 11 costs.

12 We've heard a lot of potential for how those
 13 benefits can, indeed, deliver new value throughout the
 14 supply chain and perhaps beyond. The ultimate test for
 15 that is not going to be decided here, of course. It's
 16 going to be decided out there in the marketplace when
 17 companies do determine that the benefits of RFID do, in
 18 fact, outweigh the costs.

19 Where are the concerns coming in? The concerns, d of this
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1 appreciates the need for the marketplace, to sort out
2 the winners from the losers.

3 What I find especially disconcerting perhaps
4 about the conversation so far today is a
5 misunderstanding of how the FTC law and FTC law
6 enforcement has evolved over time. We haven't heard it
7 directly from the panelists, but we have seen a lot of
8 literature and a lot of releases to the effect that we
9 are sailing without specific protections here. We don't
10 have any laws in place yet with the words "RFID"
11 encoded, and what does that mean for consumers and
12 whether or not they will be protected from the new
13 forces that this technology will unleash?

14 Well, the answer from the FTC standpoint, at
15 least if the FTC approaches this as it has approached
16 most things in the last 90 years of its existence, is
17 that you don't need "RFID" drafted onto Section 5 for
18 the Federal Trade Commission to protect consumers from
19 potentially unfair or deceptive practices that could
20 occur as a result of RFID.

21 The Federal Trade Commission has been protecting
22 consumers from deception and unfairness since before
23 we've had TV, almost before we had radio. Section 5 was
24 not amended when radio came along. It was not amended
25 when TV came along. It was not amended when computers

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1 and email and everything else came along. Certainly
2 there have been some specific statutes enacted in the
3 past and some regulations the FTC has adopted to deal
4 with particular aspects of emerging technologies, but by
5 and large, you will find the FTC enforcement in most
6 consumer protection to stem from the basic protections
7 of deception and unfairness, and privacy is no
8 exception.

9 Much of the privacy agenda at the FTC developed
10 after I left. I had the fortune or misfortune, as my
11 client might think of it, of defending one of the first
12 cases the FTC brought for privacy protection involving
13 children. I won't mention the name of the client, for
14 which I am sure I will be appreciated, but the issue was
15 this. It was the releasing of personally identifiable
16 information or at least the making available, whether it
17 was released or not, of personally identifiable
18 information, and the FTC proceeded on the basis of its
19 deception doctrine because the company had a policy in
20 place already that said we will not share, make
21 available or otherwise release personally identifiable
22 information about the children who visit our Web site.

23 That very policy has informed most of the law
24 enforcement cases we have seen so far, whether it is a
25 violation of a stated policy or especially if you go out

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1 into the states and into the class actions, you will
2 find violations of unstated policies, failures to
3 disclose that information has been made available or has
4 been shared with other marketing partners. These cases
5 have been brought by the Federal Trade Commission, other
6 consumer protection agencies and plaintiffs' class
7 action lawyers without the need for a single additional
8 piece of legislation.

9 The RFID I think will present something very
10 little different as far as the protections that we need
11 to see and at least as far right now as we can see of
12 what the technology is promising us today. The consumer
13 implications of RFID are pretty clear from the
14 presentations we've heard today. It has the potential
15 to lower costs. That is a potential that can be worked
16 out very readily in the marketplace between retailers
17 and suppliers, something the consumers will simply
18 benefit from as a result of the marketplace delivering
19 those costs through competition in the form of lower
20 prices to consumers, but what will happen if and when
21 some of the concerns we are hearing about come up?

22 My suggestion to you is that the first line of
23 defense will once again be the Federal Trade Commission,
24 as it has often been in the past, in applying its
25 Section 5 authority and stopping a company from

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1 violating its publicly stated privacy policy, stopping a
2 retailer from violating its publicly stated privacy
3 policy, and you can probably bet that there will be
4 Federal Trade Commission cases, if not class actions and
5 state attorney general cases, against abuses of RFID
6 technology long before there is ever a law that mentions
7 RFID.

8 I remember in one of my prior jobs before I was
9 here at the Bureau of Consumer Protection at the FTC, I
10 brought a case against a manufacturer of cable decoders,
11 pirate cable decoders, using the unfairness authority of
12 the FTC. It was a somewhat controversial case here at
13 the FTC, because it was a novel application of the
14 unfairness jurisdiction, but no one said to me, Bill,
15 the FTC Act doesn't say anything about cable decoders.
16 It doesn't have to. Unfairness and deception or to
17 protect consumers from unfair deceptive acts and
18 practices, whether it's computers, decoders, books,
19 information goods, consumer product goods, it doesn't
20 matter. The Federal Trade Commission Act can protect
21 us.

22 How many of these concerns do we ultimately hear
23 will ultimately become realistic concerns? I don't
24 know. Some of these remind me of the comment that one
25 of our famous presidents, not President Reagan, once

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1 said about his economists. "I remember this economist,
2 he predicted nine of the last five recessions." There
3 are undoubtedly going to be some concerns that we need
4 to take into account, but we need first to identify
5 which ones are realistic and which ones are not.

6 I think you all might have seen the stories over
7 the last couple of days of these new private companies
8 that are about to launch people into space. I don't
9 think we have to worry yet about getting a conference
10 together to determine whether or not they are going to
11 sell tickets fairly and at reasonable prices. That's
12 getting a little bit down the road.

13 Why don't we similarly wait here and find out
14 whether there is going to be a concern that legitimately
15 arises as this technology develops and then ask the
16 question whether this is a concern that is a concern
17 that cannot be addressed with the application today of
18 unfairness and deception under the FTC Act, and then we
19 will know the answer to the question whether or not we
20 need a legislation or a regulation that says, "RFID
21 needs to be regulated the following way."

22 I can tell you one thing both from my experience
23 as a regulator and my experience defending people
24 against regulators. I have yet to find a target of an
25 FTC action and I have yet to find a client of my own who

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1 thought that a law was enabling, was a freedom-giving
2 experience. When someone gets sued for violating a law,
3 I guarantee you that is a restriction that stops
4 activity. If that activity is the activity you did not
5 mean to stop, the law was a mistake. Let's let the law
6 develop where and when we know it needs to be developed.

7 Thank you very much.

8 MR. LIVINGSTON: Okay, that completes our
9 comments and presentations. If any of you have
10 questions, there will be people from the FTC coming
11 around picking them up.

12 While we're waiting for those, I have a couple
13 of questions I'd like to ask, actually a couple of
14 conundrums that I'd like to explore with the panelists.

15 The first one is really for anyone, but maybe
16 Mallory and Beth and Bill could comment on this one.
17 Everyone we've heard from today agrees that item-level
18 tagging of most consumer goods is ten years away or
19 maybe even more, yet RFID is a consumer issue and some
20 would even say a high-profile consumer issue today, as
21 reflected in media coverage. It's really a two-part
22 question.

23 If there is a disconnect between these two
24 pieces of information, why, and probably more
25 importantly, what can or should industry, government,

1 advocacy groups and others do to bridge the gap between
2 reality and perception?

3 MS. GIVENS: Well, I think that's why I'm so --
4 why I recommend that a formal technology assessment akin
5 to what the Congressional OTA used to do is so
6 important. I think we should, as experts, be looking
7 ahead.

8 I disagree with Mr. MacLeod saying let's wait
9 for the problems and then figure it out. I think, you
10 know, we're experts here. Let's take a look at things
11 that we've experienced throughout the years and maybe
12 apply some of the lessons to what we see as really a
13 revolutionizing technology, a technology that obviously
14 has tremendous benefits for many people in society, yet
15 as I said, like a classic information technology, it
16 also has that downside, something that needs to be
17 mitigated, and I think by some decent analysis and
18 planning and surveys that are done -- I think we need
19 more research that's done by impartial bodies so we can
20 get a sense of what consumers really are thinking about
21 this.

22 So, I think we should really look ahead with all
23 the knowledge that we have and the experiences we've
24 gained over the past and try to mitigate the potentially
25 bad things that could happen.

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1 MR. DUNCAN: If I may, the honest answer I
2 believe is that because people like to dream, you could
3 look back at Jules Verne, look at the old Buck Rogers
4 serials, and lots of fantastic inventions were thought
5 of 50 or 100 years before their time, and yet none of us
6 would think, let's go out and regulate, make sure that
7 doesn't happen.

8 I mean, the fact is, this is a relatively new
9 technology. In people's minds, it's very open-ended.
10 It's, in fact, technologically quite limited. So, we
11 need to find what the technology can actually achieve
12 before we put the brakes on.

13 MR. LIVINGSTON: Anyone else down there want
14 to --

15 MS. MULLIGAN: Actually, if I could, I just want
16 to build off of Beth, you know, that this is the time to
17 think about it. You know, misinformation and myths
18 flourish when there is not an adequate record, and I
19 think this particular proceeding is a really important
20 part, but I think, if anything, as information begins to
21 trickle out, unfortunately, I hate to say this, but you
22 know, I believe Ken Fishkin came and gave us this really
23 cool, "the invisible man," and I can just imagine some
24 of the stories that are going to happen, you know, Intel
25 is going to place chips in everything, right, and you

1 know, that's not what I'd want to see happen to it, but
2 in the absence of kind of big thinking, deep thinking,
3 people are anxious, and when people are anxious, you
4 know, you get stories, some of which are crazy and some
5 of which are, you know, dreaming, and some dreams come
6 true.

7 But I also wanted to say that, in fact, industry
8 has supported legislation in areas and they have viewed
9 it as enabling. I would say the E-Sign Act would be an
10 example, I would say the Electronic Communications
11 Privacy Act. There have been numerous areas where
12 industry has decided that privacy legislation would, in
13 fact, be enabling of technology, and some of your
14 clients I guess are supporting that legislation, because
15 some of the biggest technology companies I know of did.

16 MR. MacLEOD: Let's talk for just a second about
17 the need for impartial bodies. Obviously we have a
18 great ability here hosted by the FTC to have some folks
19 that are partial about the technology and partial
20 against the technology, letting the marketplace of ideas
21 work out what is the best and what is not so good as far
22 as RFID is concerned. There's nothing wrong with
23 partial bodies.

24 What if we had an impartial body at the time
25 that VHS and Betamax were fighting it out and the

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1 impartial body had picked Betamax? The marketplace is
2 the best place for us, first of all, to determine which
3 is the best technology, and then it's going to be the
4 job of the sponsors of that technology to sell it to
5 consumers, and if they fail, the consumers are going to
6 abandon them, and we are not going to have to worry
7 about any sort of legislation about RFID, because
8 consumers won't want it. The marketplace first has to
9 decide, and then we can determine whether or not there's
10 something more for the legislators to decide.

11 MR. LIVINGSTON: Okay, here's another possible
12 conundrum, and I'll address this one to Dan and anyone
13 else who wants to talk to it.

14 It seems that a flash point for RFID relates to
15 how the data is collected. There's a fear that it will
16 be collected automatically and without the consumer's
17 knowledge. Is this really the crux of the issue, or is
18 it what is done with the data regardless of how it is
19 collected?

20 MR. WHITE: If you're looking at EPC tags today,
21 it's been stated it's just a number. I really think --
22 and Beth mentioned this -- I think one of the key areas
23 we really need to look at is what you do with the data
24 and how do you manage that.

25 If it's actually captured and nobody can

1 associate that with anyone, there may be some concerns,
2 but I think most of them probably go away. So, making
3 sure the data is secure, that if there is any way to
4 associate that with an individual, that that's managed
5 in a way nobody can get at it that shouldn't, and
6 putting in the protections for the consumer there.

7 I think there's a lot of discussion that needs
8 to happen there. A lot of it's already occurred in
9 other data management type situations, but we may be at
10 another level now that we're talking about being able to
11 track after the fact.

12 MR. LIVINGSTON: Any other comments on that
13 question?

14 MR. PARKINSON: To a large extent, this isn't
15 just about a technology. It's about the technologists.
16 There's a lot of things that we can do today that we
17 don't do because there is no profit in it. The market
18 won't allow profitless services to develop for very
19 long.

20 One of the threshold factors around RFID,
21 there's a technical challenge for us, is what do we do
22 with all the data? Not good things or bad things, just
23 do with it? A fully instrumented economy today would
24 generate 30 terabytes -- to use a technical name for a
25 lot -- of data every day. We don't have any place to

1 put that today.

2 So, what we're going to do with it likely, what
3 we did with credit card information when that system
4 first started, we are going to throw most of it away,
5 and most of it isn't very interesting. Most of it's
6 picked up, dropped off, okay kind of data. Only when it
7 gets to the customer interface and we can actually start
8 associating across databases does a major concern arise,
9 at least from my perspective, and that is a very
10 technically challenging thing to do today, except in
11 special cases, and to do it generally probably is beyond
12 our ability to afford for quite a long time.

13 So, it's always difficult to generalize from
14 proof of capability pilots into general deployment, and
15 what's really challenging everybody today is figuring
16 out how to perform general deployment, even if
17 competent.

18 MR. MacCLEOD: There is a capability today and
19 the information exists today that someone can make a
20 great deal of money selling. Every time I shop at
21 Safeway, every time I shop at CVS, I run my membership
22 card through the scanner. Safeway and CVS know a whole
23 lot about my habits, and I guarantee you if they try to
24 sell that to anybody, that is almost certainly going to
25 get out, and there are a number of law enforcers in this

1 room who will give them the misery of their corporate
2 lives, and what RFID is doing is simply providing a
3 different way of gathering information that can be
4 misused or can be used properly just as the information
5 that is being gathered today. It is the conduct that we
6 have to worry about, and it is the conduct that is
7 already being protected by the privacy policies
8 announced by retailers and by the law enforcers and by
9 the plaintiffs' lawyers who will make it very painful on
10 anybody who violates those promises that they have made
11 to consumers.

12 MS. FINN: I'd like to ask a question, and maybe
13 Beth and Sandy, you'll want to comment on this or
14 anybody else who wants to jump in.

15 We've heard a lot about the supply chain and a
16 little bit less about some of the item-level tagging
17 applications and what that may mean for consumers and
18 some of the applications that may benefit them if they
19 leave these tags enabled, you know, along with
20 presenting in terms of, you know, monitoring something
21 that you want to take, to raise the possibility of
22 tracking stolen items, and we may hear more in later
23 panels this afternoon about what the future might hold.

24 To the extent that people are talking about
25 notice to consumers and choice about whether or not to

1 kill tags, because there might be these applications
2 that would be of interest to them if they leave the tags
3 active, I'm wondering if you could sort of think out
4 loud for me what that kind of notice and choice regime
5 would look like and what kinds of burdens it might
6 impose on consumers.

7 For example, are we going to get privacy
8 policies where we have to make kill choices every time
9 we go to the grocery store or the office supply store or
10 a clothing store on an item-by-item level basis? Can
11 you give us a sense of how you envision the notice and
12 choice sorts of protections working?

13 MS. HUGHES: Well, I can start. You know, we
14 already have some guidelines in place that really deal
15 with the technology the way it is today, and basically
16 that's giving the choice to the consumer and notice on
17 the products. So, I mentioned before, for example, that
18 we are putting tags on our cases, you know, just for the
19 chance that it could actually end up in a consumer's
20 hands, even though that's not our intent.

21 I think that that will probably continue to
22 evolve as we get more education out there, where
23 consumers start to know that when they see the EPC
24 symbol that's on a product, just as they would, you
25 know, "kosher" or "recyclable" materials, that they

1 would want to know what that is, but that's a huge,
2 massive education campaign to be able to get to that
3 point.

4 As far as choices, I think as the technology
5 starts to develop, you know, there will be all different
6 kinds of things that could be possible. It might be,
7 you know, a vision that people see for the future, is
8 that all your products are tagged, they will be in a
9 smart cart, and you can just kind of walk out, you know,
10 because it will know what your purchases are, and you
11 put your loyalty card in there, your credit card, you
12 know, you don't even need to talk to anybody or see
13 anybody.

14 That's really far off, but it might be that
15 there would be some sign that would come up, you know,
16 to the consumer as they're putting in their loyalty
17 card, or let's say even through like a "you-scan," that
18 says, "Do you want your tags killed or not," or
19 something like that, and then it just automatically does
20 it when it scans the tags, and there is no intervention
21 required at all. I mean, that could be a solution.
22 It's a process as well.

23 There are also guidelines that may need to be
24 put in place. So, it's not all technology, and it's
25 something that could be self-regulated as well.

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1 MS. GIVENS: Yeah, and I brought something with
2 me, I'm so glad you asked this question, because now I
3 can do my show and tell. This is a TrackPhone package,
4 and I am quite certain it has an RFID tag in it. It's
5 right next to the magnetic theft protection device, but
6 I'm pretty sure that's RFID.

7 What I would do with this, just from a -- I
8 guess one of the things that we do as the Dear Abby of
9 privacy is we also try to quash conspiracy theories when
10 people call us and ask us, is such and such really true?
11 What you could do here is just put a red dotted line
12 around it that says, "EPC tag" or "RFID tag," and if
13 it's something that the individual kept live and wanted
14 to keep for warranty or to attach to their receipt if
15 they needed to return it, they could cut it out, put it
16 in a little mylar sack and store it.

17 I mean, I think probably I'm a little bit of an
18 unusual consumer in that I'm a consumer advocate by
19 profession. I do keep receipts. I do know about the
20 fact that you don't have to keep things like this or the
21 product registration cards that you get in the packaging
22 to return an item, but there are some things that I
23 think that the industry could do to reduce the
24 conspiracy theory problems, and that would be clear
25 labeling, and also, never, ever, ever embed an RFID tag

1 in clothing, in shoes, in one's eyeglasses, in anything
2 that is worn or carried by the individual, and I agree
3 with Lee Tien, that includes driver's licenses and
4 passports. But I think just clear labeling, enabling
5 individuals to destroy them if they want to, keep them
6 if they want to, of course, kill them if they want to.

7 The other thing is I think individuals should be
8 able to have their own readers or go someplace where
9 they can read what they have on their person or what
10 they think they have.

11 I think those are the extent of my comments. I
12 think there's a lot of things, though, that industry can
13 do to allay suspicions and fears, and labeling is a big
14 one.

15 MR. LIVINGSTON: Okay, this is for John and
16 Sandy. Was the RFID consumer study, the Capgemini
17 study, peer reviewed and published in a reputable
18 research journal? Can other researchers get a copy of
19 the methodology used so they can attempt to replicate
20 it? I ask because previous studies conducted by the
21 Auto-ID Center, including one done in conjunction with
22 Procter & Gamble, found that consumers were very opposed
23 to RFID on both privacy and health grounds.

24 MR. PARKINSON: So, it was not a peer-reviewed
25 study, was not published in any kind of formal journal,

1 reputable or not, but it is published by us, and the
2 protocol was actually done by a third party to a design
3 that we co-developed, and the protocol is published.

4 So, what questions we asked, what was directed,
5 what was undirected and so on is available, and we are
6 happy to open all that up so anybody else can replicate
7 it on a different population. For economic reasons, we
8 are a business, not a research organization, so for
9 economic reasons, we limited the panel size to a
10 statistically valid profile. So, we did take account of
11 gender, income, geography and education to the extent
12 you can in a small sample survey.

13 It was just over a thousand respondents when the
14 survey was cut off. The results have statistically
15 meaningful inferences, but if you did the study a
16 thousand times, you would get a distribution of results
17 that would deviate somewhat from the percentages that
18 we've produced, not necessarily in our view by very
19 much.

20 MS. HUGHES: And I can talk about the research
21 that was done by the Auto-ID Center, and it wasn't done
22 by P&G, but we let them use our services since we are
23 pretty good at doing market research by consumers, the
24 number of tools that we have available, and one of the
25 outcomes from that study as we did find out how

1 consumers perceived the technology is to implement from
2 the Auto-ID Center the Independent Advisory Council
3 that's been led by Elliot Maxwell, who you will hear
4 from later today. So, that was a direct action that
5 came from research that was done by the Auto-ID Center
6 and a number of the members of Auto-ID Center where we
7 saw that there were concerns from the consumer sector,
8 and we did something about it.

9 MS. FINN: Thank you.

10 Another question from the audience, has the
11 regulation of RFID already begun? Is this workshop a
12 sign that it's begun? And at the state level, seven
13 RFID bills were introduced this year in five states. Is
14 this a good thing or a bad thing?

15 I am going to answer part of this question, is
16 this workshop a sign that regulation has begun. The
17 answer is no. From the FTC's perception, we often have
18 these workshops, and they are not a precursor to
19 regulation.

20 But as to the other aspects of state regulation,
21 maybe Bill and/or Deirdre would like to speak to that.

22 MR. MacLEOD: Well, I think it is probably
23 premature to say that RFID regulation has begun, but it
24 would also be misleading for the reasons I've stated
25 before, and that is RFID is a very well-defined problem

1 in the consumer protection space, the consumer
2 protection agencies recognize, and they will address it
3 if RFID becomes in any way misused to the detriment of
4 consumers.

5 So, once again, we don't have to have an RFID
6 bill or an RFID regulation by either a state or the
7 Federal Trade Commission, but I can guarantee you -- and
8 I can do this because I no longer work at the FTC and I
9 don't have to qualify my promises -- if someone uses
10 RFID to start disseminating personally identifiable
11 information contrary to their privacy policies, they're
12 going to have the FTC all over them. They're going to
13 have the states and they're going to have plaintiffs'
14 lawyers as well. In that respect, RFID is indeed
15 regulated, and it's the kind of regulation that we
16 should welcome.

17 MS. MULLIGAN: You know, certainly there are
18 state efforts to regulate RFID, primarily, kind of in
19 the consumer marketplace. I think that probably what
20 you got from the opening panel was that the use of RFID
21 spans lots of different markets and has lots of
22 different implications regarding privacy, and you know,
23 the kind of legislation or the kind of self-regulatory
24 guidance that you might develop in the Procter & Gamble,
25 you know, EPCglobal commercial space would be I would

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1 imagine quite different than what you might see
2 developed for the invisible man, and so my guess is
3 that, you know, we're going to continue to see, as we
4 always do, legislation that, you know, is kind of
5 brought about by the latest article in the newspaper.

6 My hope would be that while the F2sFG&cesut by the latest :

1 a reduction in prices from this kind of corporate
2 savings?

3 MS. HUGHES: Well, overall, the whole supply
4 chain is involved in the savings. You mentioned the
5 savings, but you don't talk about the cost that goes
6 along with it. So, we're still working on a business
7 case that would come about, but the end result is that,
8 yes, we're doing it for consumers. I mean, that's the
9 reason why we're there, as I mentioned before, we have
10 the product they want on the shelf when they want it at
11 the right price, and that all goes together.

12 So, it's not just price-oriented itself, but
13 it's the whole shenanigans, the whole thing that you see
14 on the shelf, the first moment of truth, are we meeting
15 what the consumer wants or not?

16 MR. DUNCAN: And Ted, I guess because you were
17 asking two questions, one was really an apple and the
18 other was an orange. The first one was really talking
19 about I think the expensive tags that are used at the
20 pallet level, and there the savings are spread across
21 the entire pallet, and it's much more significant than
22 the same tags used at the item level.

23 As to whether the savings is passed onto
24 consumers, the honest answer is people can't expect to
25 see a dollar-to-dollar pass on of savings, because a

1 dollar saved, you won't see a dollar more, because
2 retailers don't compete that way. The way we compete is
3 by taking whatever it is they do best and trying to
4 deliver that as an incremental value to consumers.

5 For example, Neiman Marcus and Saks don't
6 compete by offering \$25 off on the merchandise they
7 sell. They compete by having the kind of sales force in
8 the store that consumers who shop there want to see
9 there. That's a very different model than, say,
10 Wal-Mart, which is trying to shave every cent off. So,
11 yes, there will be savings, but they will appear in a
12 different form.

13 MS. HUGHES: And just to qualify some of the
14 numbers there, for us, at case and pallet even, you
15 know, we've said that it needs to be done at 5 cents a
16 case. So, we are way far away from that, and if you
17 consider any further down to item level, as I mentioned
18 before, you know, some of the prices of our products,
19 there need to be, you know, some really major savings to
20 offset the costs so that we can even, you know, provide
21 the same price, or we just won't do it for consumers.
22 As I mentioned, it's the whole delivery to consumers
23 there.

24 MS. FINN: Another question is, have any of you
25 determined whether database collection of RFID data

1 linked to an identified individual violates European
2 privacy law, and how do you get meaningful consent to
3 linkages like that with such low levels of consumer
4 awareness? It didn't specify who should answer, but if
5 anyone wants to volunteer...

6 MR. PARKINSON: Okay, so I work for a European
7 company, so this is something we worry about every day.
8 The fact of linkage does not violate European law. It's
9 what you do with the linked data afterwards that puts
10 you at threat, and there are gray areas here that the
11 legislation was not designed to deal with, particularly
12 the movement of goods which carry information with them
13 across national boundaries, which in some
14 interpretations is just by itself illegal without the
15 consent of the carrier, which could be an individual.

16 When the original privacy legislation was
17 written, nobody had thought of that. So, we expect to
18 see some evolution of practice and policy leading to
19 evolution of legislation in Europe. It gets even more
20 complex when you cross territoriality, because it's just
21 as easy for me next week when I'm going to be in Paris
22 to pick something up which could be tagged and legal in
23 Europe, fly back to the United States, and have it
24 tagged and illegal. So, this is not just a North
25 American problem. The supply chain is global.

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1 Seventeen percent of everything that you buy is
2 made in China these days, and it's on a rising trend.
3 So, we have to start thinking about what are we going to
4 do to harmonize our point of view about acceptable
5 practice on a global scale, and consumers are going to
6 be everywhere, and they can buy goods no matter how
7 marked.

8 You might, for instance, want to think about
9 perfectly valid market legislation which requires you to
10 learn Chinese in order to know what was marked. Those
11 are the types of issues that you start to look at when
12 you look at it on a global scale.

13 MS. MULLIGAN: I haven't looked specifically at,
14 you know, how the European Union Data Protection
15 Directive would map onto RFID, but I do think, you know,
16 when you talk about pushing data out to the end points,
17 we've focused before on kind of distributed computing,
18 and you know, there are some very difficult questions.

19 So, for example, to the extent that -- when you
20 take the library as an example, in order for somebody to
21 access information at the library, they have to come
22 with a subpoena, but now they could, in fact,
23 reconstruct it, because there is some information on the
24 book that allows them to kind of easily assemble that.
25 Would it be in violation of the state law?

1 standards, and this is for everything, you know, from
2 the technical aspect as well as privacy, and you know,
3 the European Union is kind of, you know, still trying to
4 decide how they feel about RFID, and we're working with
5 them as well.

6 So, you know, as much as we appreciate forums
7 here, we're doing the same thing in Europe, and we will
8 be doing the same thing in other regions as well, so we
9 come out with some common solutions, but within Europe,
10 for example, some countries can't agree on whether it
11 falls under the current EU Directive or whether it
12 doesn't, et cetera. So, there's a lot of work that
13 needs to be done there on all fronts.

14 MR. LIVINGSTON: Okay, here's one for Beth.
15 We've heard today that there are consumer RFID
16 applications -- drugs, meat and tires come to mind --
17 which can save lives but require an item-level tag. In
18 many cases the consumer benefit is enhanced if tags
19 remain after sale. Does the position statement on the
20 use of RFID on consumer products which your organization
21 has co-sponsored and which calls for a voluntary
22 moratorium on the item-level tagging of consumer items
23 apply to these categories?

24 MS. GIVENS: Well, the position statement, which
25 you could read at privacyrights.org and also

1 spsychips.org and some other Web sites, has a couple of
2 attachments to it. One of the attachments is a
3 discussion of RFID applications that would be considered
4 beneficial and would not be problematic to the
5 individuals and organizations that signed onto that.

6 But I want to return to something I said
7 earlier. I think some benefits can come from not
8 necessarily EPC tagging, where there's a unique
9 identifier for each can of Coke, but as I mentioned,
10 there's certain types of tagging that could be generic,
11 for example, that identifies a toxic. It could just
12 say, this is lead, this is nickel cadmium, when you take
13 it to the landfill.

1 that might help consumers, we have heard a lot about
2 kill functions. Does killing RFID tags have to be all
3 or nothing? To the extent that there's a potential for
4 beneficial uses of tags remaining on, is there a way to
5 have tags not be so promiscuous, to allow consumers to
6 leave them on but only to be read by authorized readers?

7 MR. WHITE: There have been several things
8 talked about in the industry, in fact, we talked about
9 within our company about a couple ways to do it. One
10 mechanism kind of goes along with what Beth is saying,
11 is just killing the serial number and leaving the
12 product code and manufacturer code live. We talked
13 about ways of just tying into a transaction, maybe
14 rewriting the code, and it's no longer individual items.

15 There's also some IP that we have put in about
16 disabling the tag for range and maybe kind of shooting
17 it in the leg so you can't read it more than an inch
18 away or you actually have to have it up against
19 something to read it. So, there are multiple technical
20 possibilities as we look at this in the future that are
21 beyond just killing it.

22 Killing may be what we want twith njTban than an inch

1 couldn't read it if they didn't want to. You can
2 encrypt the thing where you have to have a certain
3 reader in order to actually read the tag, a lot of
4 different things that the consumer might be able to use
5 in the future.

6 MR. DUNCAN: I think we have to be really
7 careful when we talk so promiscuously about the idea of
8 killing technology, because the unintended consequences
9 of that run deeply as well. We've talked a lot about
10 the imagined consequences from the privacy perspective,
11 but in terms of trying to develop new markets for these
12 products, you want the products to have a life so that
13 those markets can develop.

14 For example, I mean, one of the not very far
15 outside ideas, we demonstrated this at the NRF show this
16 year, was the smart refrigerator and the idea that if
17 there is sufficient demand for it, there can be products
18 within the refrigerator that can read the products
19 there, the other merchandise, and let you know whether

1 good reason to kill it. So, I think we have to keep in
2 balance the benefits and the costs.

3 MR. PARKINSON: And you have to remember that
4 the architecture for deployment we're working with today
5 means that the tags are dumb. What you get off the tag
6 is a bit stream. It doesn't mean anything. It's just a
7 number, and unless you know how to decode the first
8 eight bits of the stream, you don't even know what kind
9 of number it is. Without being able to hit a reference
10 server, an object name server, to find out what that
11 stream means, all you've got is a bunch of numbers.

12 The controls -- we could encrypt those so that
13 they don't even mean directly what they mean when you
14 individually manage to decrypt them. Control of the
15 object name servers and how you get to the intelligence
16 that tells you what that stream means should be the
17 primary place to start applying policy, because that's
18 an easier, at least for now, form of control.

19 Long term, we can build scenarios that will put
20 all that data eventually into the public space, because
21 with enough cheap computing and cheap storage, you can
22 reverse-engineer the content of the object name servers
23 into public versions, just like you can now with CDs and
24 movies. But you can't defend this with technology, and
25 I don't think any of the technologists looking at this

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1 MS. GIVENS: I think I am going to show that I
2 am not a typical consumer. I honestly haven't been
3 following that campaign, so I really don't have a very
4 good answer on that one. It would be interesting if
5 someone on the panel is following that campaign and
6 knows what in the world he just said.

7 MR. PARKINSON: Okay, so a SIM chip is a
8 subscriber identification module chip inside a cell
9 phone, which in GFN and certain other types of cell
10 phones tells you who it belongs to. It tells you who it
11 belongs to by linking it back to a telephone company
12 referential database.

13 New generation phones also contain GPS
14 technology, which allows the mobile 911 service to
15 figure out within about a hundred feet, in ideal
16 conditions, a hundred meters on average, where that
17 phone is. So, Coca-Cola thought it would be cool to
18 give you the opportunity, if you opt in, for it to tell
19 you where the nearest case of Coke is if you want to buy
20 one holding your phone.

21 MS. GIVENS: It sounds as though it has an
22 opt-in, and in order to participate, you would have to
23 be fully informed as to what you're up to. It sounds to
24 me as though it would comport with the privacy
25 guidelines that I'm comfortable with, but again, you

1 would have to know a little bit, and like I just

1 considered an RFID type of situation.

2 I do think that no matter how much you try and
3 provide information, there are some people that probably
4 won't read it, and you have to take into that account,
5 and you have to do your best to try and be up front and
6 honest about them, and I think to provide that in a way
7 that people can get access to it, I think that's about
8 all you can do, because you can't force people to do
9 something they don't want to do.

10 MS. HUGHES: Again, you know, as I mentioned
11 before, the education, you know, whatever was done to
12 really recognize symbols before and what they've come to
13 mean is something that's going to, you know, take a long
14 time to do through all different types of media and
15 different types of forum, but until then, I mean, what
16 you've seen before and what Simon told you about what
17 was in the video, is just to get in the face, for
18 example, of consumers as they are buying a product.

19 HP printers at Wal-Mart, there were these shelf
20 tear-off tags that consumers could take with them, and
21 the labels that I mentioned that were on cases, and you
22 are welcome to come by and read one of these. It's got
23 questions and answers on what is electronic product
24 code, et cetera, and on the back, and the value to them.
25 The ones that are on the cases say, for example, to

1 improve product availability for consumers, packaging
2 contains electronic product code. Upon purchase, the
3 EPC tag can be discarded, and it gives the Web site
4 address of EPCglobal, Inc.

5 So, I think there is going to be some overt
6 things that we need to do until we get to the point
7 where it's common knowledge.

8 MR. LIVINGSTON: I have a two-part question. Is
9 point of sale the best place to do that, and the second
10 is sort of a rhetorical question, I guess, would it have
11 been better for the retailers and packaged goods
12 companies that have done the various trials over the
13 past couple years to have made more of an effort to
14 communicate in that way?

15 MR. WHITE: My understanding from the retailer
16 side and dealing with retailers, point of sale is not
17 the place to do anything. You want to get them out.
18 So --

19 MR. LIVINGSTON: I guess I meant more the shelf
20 than the point of sale itself.

21 MR. WHITE: Okay, now the shelf, where they are
22 actually shopping, where they may be trying to make a
23 decision, that may be the place. We've also had people
24 talk about a consumer service desk to provide further
25 information, have people there to maybe answer

1 questions, they might want to understand what's going on
2 in the store, and the Web site. So, I think all those
3 areas are applicable, and trying to do it in the store,
4 where it's at, is probably the best place. I don't
5 think you could do it any other place.

6 MS. GIVENS: If I could add something, I think
7 we can learn from the privacy notices that came out
8 starting in July of 2001 regarding the financial
9 institutions. I think something that should be avoided
10 is what I call happy face technology, with a happy face,
11 and kind of overselling, doing the marketing hype, you
12 know, RFID is a technology that's going to benefit you
13 and make life wonderful and satisfying and oh so
14 convenient.

15 I think it's better just to keep the messages
16 simple and factual, and I think that consumers -- those
17 who at least pay attention to such things -- mistrust
18 something that's got kind of an aura around it of hype
19 and an oversell.

20 MR. LIVINGSTON: Okay, we have got time for one
21 or two more. Here are two related questions.

22 The first one, and this is for John and anyone
23 else who wants to comment on it, can you clarify what

1 And relatedly, it sounds like there are no more
2 privacy concerns with EPC than with bar codes. Is it
3 different?

4 MR. PARKINSON: So, there is no such thing
5 technically as an EPC code. There is a set of types of
6 tags, and the type determines what you get when you read
7 it. They range from tags that are active, so they're
8 powered, they transmit and can be picked up by receivers
9 in a very wide area, down to the kinds of tags that will
10 eventually go on consumer goods cartons, which are not
11 powered. They are a chip plus an antenna with a 96-bit
12 code in a format defined by EPC in the chip.

13 To be read, they have to be within -- their spec
14 says about 20 feet, but the practice commonly is running
15 10 to 12 feet, although a power reader broadcasts a low
16 power radio frequency field which causes the chip in the
17 tag to pick up just enough energy to send out the bit
18 stream of what it is, which the reader then picks up,
19 and what it picks up is simply the set of codes, and
20 there are fields within the code.

21 The first field says what kind of code the rest
22 of the fields are. So, you could use the tag format for
23 lots of different things, including proprietary coding
24 schemes if you choose to. So, you can make them exactly
25 identical to bar codes if you want, as the Auto-ID

1 Center and EPCglobal have done a very good job from a
2 technical perspective in building a lot of flexibility
3 into the scheme that tags and reader combinations use to
4 work.

5 To figure out what the rest of the bits mean,
6 you have to refer to an object name server that has the
7 lookup tables that said, okay, so field one says
8 25-26-34, that's Coca-Cola. Field two tells you that
9 it's a 24-pack of 10-ounce cans of Coke. And then you
10 can put some other information in if you want to, which
11 can either be in the three fields on the tag or can
12 simply be pointed to by the object name server, which
13 could point back to the Coke bottler that would tell you
14 when those cans were filled.

15 So, you have a number of layers of information
16 management in the architecture that you could choose to
17 implement in flexible ways, and at each level, you can
18 choose to put both encryption, no random person can make
19 sense of the bit stream, and security, you have to
20 provide permission to get to the next layer of
21 information.

22 So, is it different from bar codes? There are a
23 couple of critical differences, the biggest being that
24 it doesn't have to be visible on the item. So, I can
25 put a tag inside the packaging rather than having to put

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1 it outside, because bar codes must be visible to be
2 read, but it doesn't have to have any obvious
3 orientation to the reader, as long as it's within range,
4 so that readers can be hidden. They can be made
5 nonobvious in a way that you can't with a bar code or a
6 laser scanner.

7 MS. MULLIGAN: Well, just out of -- nobody has
8 ever talked to a bar code, right? I mean, you wave it
9 over -- you read it at the point of sale, and that's it,
10 and potentially, you come out, and this thing continues
11 to talk to other readers without being in any contact
12 with them, and I think for a consumer, that's a very
13 different experience potentially.

14 MR. PARKINSON: I would argue that it's an
15 extension of an existing capability, because as long as
16 a bar code is visible, I can read it from almost a mile
17 away with a laser scanner. I just have to know where to
18 point it. So, we have changed the detailed nature of a
19 problem without changing the problem, from what's the
20 persistence of the information contained in the item and
21 how do I get to it without the consumer having to know
22 about it.

23 MS. MULLIGAN: I just learned something. I
24 didn't know you could read them from a mile away.
25 That's fascinating.

1 acknowledged expert in RFID use in the supply chain. He
2 has presented on RFID in many forums, most recently
3 hosting IDC's RFID Update Conference held earlier this
4 month in Boston.

5 Next we will hear from Katherine Albrecht, the
6 Founder and Director of Consumers Against Supermarket
7 Privacy Invasion and Numbering, or otherwise known as
8 CASPIAN. CASPIAN is a national grass roots consumer
9 group dedicated to cutting supermarket loyalty or
10 frequent shopper cards; CASPIAN's efforts are directed
11 at educating consumers and condemning marketing
12 strategies that invade shoppers' privacy and encouraging
13 privacy-conscious shopping habits.

14 As many of you if not most of you are aware,
15 Katherine and CASPIAN have been extremely active in
16 raising awareness about the consequences for consumers
17 of RFID use, beyond the supply chain in particular.
18 Katherine holds an Undergraduate Degree in Marketing and
19 is currently a doctoral candidate in education at
20 Harvard University where she is writing her dissertation
21 on consumer education and privacy.

22 We will conclude this panel with Jim Waldo, who
23 I had an opportunity to see speak at an RFID conference
24 in Seattle last month. So, I can say from personal
25 experience that he is not only knowledgeable but pretty

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1 funny, too.

2 He is an engineer with Sun Microsystems
3 Laboratories where he researches large-scale
4 distributive systems. Like Katherine, he can also be
5 found on the Harvard University Campus, where he is an
6 adjunct faculty member of the computer science
7 department.

8 Jim will be discussing what the future of RFID
9 will be expected to bring as well as what it will likely
10 not bring. So, let me turn things over to Chris.

11 MR. BOONE: Thanks, Julie.

12 Again, my name is Chris Boone, and I'm a program
13 manager with IDC. For those of you unfamiliar with IDC
14 as a company, we are an IT market intelligence and
15 research firm that is actually celebrating our 40th
16 anniversary this year. Our main focus is to work with
17 IT vendors, and then secondarily, we typically work with
18 the financial community to understand market
19 opportunities around hardware, software and IT services,
20 the size of those markets and forecast their growth into
21 the future. So, it gives me great pleasure to be here
22 with you today and present our vision for RFID
23 specifically within the retail supply chain and try to
24 answer the question whether or not this really is the
25 next big thing, as it's currently being touted.

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1 So, just quickly going through the agenda, we
2 will start with a brief discussion on promise versus
3 reality. We won't spend much time about promise,
4 because that's been talked to death I think today. We
5 will spend a little more time on the reality side of
6 that slide.

7 We will then talk about the RFID ecosystem for
8 the retail supply chain as we see it, again very briefly
9 there, and that is going to build into I think the crux
10 of the presentation, which is our forecast for RFID
11 within the retail supply chain, how we think it's going
12 to be adopted over the next five years, and then a
13 long-term view as well, and then briefly touch on
14 consumer privacy, because that's also going to be the
15 main focus I think for today's panel.

16 Oh, and by the way, you won't find me on
17 Harvard's Campus, even though I live in Boston, so one
18 of these kids is doing his own thing.

19 So, the promise, as I mentioned earlier, I think
20 has been talked to death today. There is a lot of
21 promise around RFID. It is the oldest new technology
22 out there in the marketplace. I won't go through this
23 specifically. The one thing that hasn't really been
24 mentioned too much on the promise side which I think
25 should be highlighted is that with RFID, because we will

1 eliminate the line of sight with how the technology

1 tags. So, that's an issue for the global supply chain.

2 There still is a lack of end user knowledge. I
3 think by now the top hundred suppliers for Wal-Mart are
4 pretty well versed in how RFID works, but the remaining
5 members of their supplier community are probably not as
6 well versed. The 34,000 suppliers of the Department of
7 Defense also, who will be coming on board slightly
8 outside of this realm, are still just learning about
9 this technology, and they are all struggling to build a
10 business case around it.

11 From a technical aspect, there are issues of

12 interference. We have talked about it, I think by now the trucks, but
hojT?aythiUHknowledg thsed iYes the Fp iss don'Tikepwa ta 3 s

1 just said about Coke? So, the true visibility is not
2 necessarily a reality.

3 The work-around that's been going around right
4 now is that you take all the electronic product codes
5 from all the cases and you assign them to the electronic
6 product code on the pallet, so when the pallet runs
7 through, in theory, all those cases just ran through the
8 portal as well.

9 Pilots are going on to see how we can figure out
10 how to make that technology work better, place the tags
11 better within certain products, use different tag
12 designs to get around that. One frequency in tag design
13 does not fit all. Today we've been talking a lot about
14 UHF, but we have also mentioned high frequency or 13.56.

1 quickly on this slide, most of what we have been talking
2 about today is the bottom part of this slide, it's the
3 tags and readers and technology, and every company that
4 is going to deploy this within their architecture is
5 going to have that layer, but that layer then is
6 basically an enabling technology as we've talked about.
7 It supplies data up to the enterprise, application and
8 system infrastructure layer of each company, and then
9 each company has got their own business processes, and
10 these are specific to an industry as well as to an
11 individual company.

12 So, what's important for these companies to ask
13 is, not necessarily how am I going to comply with the
14 Wal-Mart mandate, but what am I going to do if I have
15 access to realtime supply chain data at a more granular
16 level than I do today, and how is that going to make me
17 a better business? So, instead of compliance, we have
18 got to start building business cases at the top level.

19 We also need to be able to share this data
20 somehow. We think it is going to be through some sort
21 of partner exchange or portal. I don't believe there
22 will be this ubiquitous network that's talked about
23 because I don't think there's a business case for it
24 today. Wal-Mart doesn't want its competitors to read
25 tags that are from Wal-Mart stores. Wal-Mart probably

1 also doesn't want its suppliers to read information
2 about other suppliers. They want to control that
3 information for competitive reasons. So, we think these
4 are going to be somewhat private exchanges. Wal-Mart
5 will probably leverage retail links to do this and other
6 retailers will do something similar as well.

7 Okay, let's move into the adoption. This slide

1 will be tagging pallets and cases that go to Wal-Mart.
2 Where are they going? They're going to three
3 distribution centers out of a total of 108 distribution
4 centers Wal-Mart has in the U.S., and they probably
5 won't be tagging all cases and pallets that go to those
6 distribution centers. They're only going to be tagging
7 those that make the most sense from a business case
8 perspective: fast-moving goods, high-margin goods.

9 Procter & Gamble, I don't know, we could ask, is
10 probably not going to tag every single product that goes
11 to its distribution centers. They probably can't afford
12 to do it yet today. They want to make sure the
13 technology works first. So, that's what I mean by
14 partial compliance by January 2005.

15 By 2006, we think we are going to see more
16 retailers deploying RFID -- Target, Albertson's made
17 announcements, we haven't heard from them since. We
18 think there will be other retailers that will be doing
19 similar work. We may not hear official announcements,
20 but we think that's going to happen, and these
21 deployments are going to start to pick up next year and
22 continue to broaden in 2006.

23 Wal-Mart has already said actually they are
24 going to go from three distribution centers to six
25 distribution centers by June of next year, and then to

1 13 distribution centers total by October of next year,
2 and ramp up from 150 store back rooms to 600 store back
3 rooms by the end of 2005. So, we're still only going to
4 be at 20 percent of all Wal-Mart's retail stores and
5 about 13 percent of their distribution centers at the
6 end of 2005.

7 Moving into 2007, we think we're going to be at
8 close to 100 percent compliance for Wal-Mart's mandate
9 amongst all suppliers. Again, we don't know exactly how
10 far Wal-Mart will be expanded at that point in time, but
11 we think suppliers will have gotten to a point where
12 they are moving in lockstep with Wal-Mart, and actually
13 by 2008, here in the U.S., we think that these pallet
14 and case-level deployments are actually going to be
15 expanded to the point where we won't be deploying more
16 readers necessarily, but what we will continue to do
17 beyond that is spend on tags and maintenance.

18 So, actually, we think the market is already
19 going to start to flatten at that point in time. We
20 will reach we think that elusive 5 cent number. That's
21 actually just a factor of our model. We weren't trying
22 to get to it, but when we saw how many tags we thought
23 would probably be purchased, that was the number we
24 actually arrived at.

25 So, what does it look like in terms of spending

1 over the next five years? We thought the market was
2 approximately \$91 and a half million at the end of last
3 year, going to about \$1.3 billion in by 2008. You will
4 notice how it's very close to 2007, that leveling off
5 trend happening there. You will also see that we have
6 some fits and bursts in 2005 and 2007, and this forecast
7 says that hardware is making up the largest portion of
8 the number. This is different from what some of the
9 other speakers have talked about today.

10 The reason why we think hardware is going to be
11 so high is that even though tags are going to be cheap,
12 5 cents at the end, we are going to be buying a lot of
13 tags by 2008. Software and services are a bit small in
14 this forecast, because we've limited our definition very
15 specifically. So, we just kept it to RFID middleware
16 and just services to deploy the technology, nothing
17 more.

18 And very quickly, because my time is up, we want
19 to show you a long view here. We think that we're going
20 to have a peak around 2008. We think it's going to
21 decline beyond that, as we're trying to figure out how
22 to do item-level tagging in the future, and that won't
23 pick up for quite a number of years off. There are
24 going to be a number of technical and cost challenges
25 that we still won't be able to overcome until well

1 beyond 2008.

2 This follows a similar pattern to other "next
3 big thing" technologies. Those of you who followed the
4 PC market in the early eighties may recognize a similar
5 growth pattern, big boon, bust, then a real wave of
6 growth happening well beyond that. We think that's
7 going to be the case here as well.

8 Then consumer privacy, I am going to leave most
9 of this to I think Katherine's talk here. It is a top
10 concern. State legislation has been introduced, we have
11 already heard in a number of states about a consumer's
12 right to know if the technology has been deployed, and I
13 think the take-away message from this is regardless of
14 legislation, what retailers and suppliers should not do
15 with the technology is just as important as what they
16 can and should do with the technology.

17 And here's my email address if you need to
18 follow up with me afterwards. Thanks.

19 MS. ALBRECHT: Thank you, Chris, for that
20 overview of how RFID is coming.

21 I'm Katherine Albrecht. I'm the Director of
22 CASPIAN. Many of you in this group I'm sure know me as
23 a consumer privacy ally, and others of you perhaps know
24 me as the person who shot down the Benetton trials and
25 gave them some headaches last year, that they engaged in

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1 some unannounced and secret trials involving consumers
2 and RFID.

3 I am going to fit about a half an hour worth of
4 slides into about 15 minutes, so I am going to advise
5 anybody sitting in the middle, if you would kind of like
6 to position yourselves so you can see the slides, this
7 is a very slide-centric and image-heavy presentation I
8 am going to be delivering.

9 For those of you who are not familiar with our
10 work, you can find it -- our primary RFID work is on
11 spychips.com. My background, as Julie mentioned in the
12 introduction, is fighting supermarket loyalty cards and
13 other forms of data collection. You can find that
14 information at nocards.org, and there, of course, is
15 information on our two boycotts, which were Benneton and
16 also Gillette.

17 I think one of the key things to keep in mind
18 here in understanding and separating out what the
19 privacy issues are revolving around RFID is the
20 difference between essentially three databases, and I've
21 developed this myself as kind of a way to help to
22 untangle some of the privacy concerns versus just
23 looking at supply chain issue-types of questions that
24 have been raised.

25 The first database is the one that any company

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1 manufacturing something would be looking at on the
2 factory side. When something rolls off an assembly
3 line, as it moves from the assembly line onto a truck,
4 into a warehouse, into a distribution center, that would
5 be the first database. That database really doesn't
6 pose any issues for consumer privacy.

7 When I say "database," what I mean is that when
8 you put an EPC or an RFID tag into an item when it's
9 manufactured, the only information contained on the
10 cheapest versions of those tags would be the actual EPC
11 number or the unique ID number. That unique ID number
12 in and of itself doesn't really communicate anything in
13 the same way that your social security number doesn't
14 really communicate anything, but when you link it up
15 with databases, that's when you can find out information
16 about where you've been, where you've worked, what
17 credit you've applied for and other information about
18 you. It's similar here. So, the first database we've
19 identified is not really involving any privacy concerns
20 for consumers.

21 The second one is the database that enables you

1 of Pantene shampoo, for example. If I can scan your
2 briefcase or your wallet or your purse or your pocket
3 and I can get that number back, I can look it up and
4 essentially know what's in your briefcase, your pocket
5 or your purse. There, I think the implications for
6 privacy are quite obvious to consumers.

7 Let me jump ahead to these slides. This is the
8 first one, database number one, Cherry Chapstik produced
9 on assembly line 12 at 3:15. No one is particularly
10 worried about that from a privacy perspective.

11 Database number two, I scan your pocket and I
12 discover item blah-blah-blah, 308247, I'm shortening
13 that down to the end. If I look that up in what will be
14 the widely available EPCglobal database, I will be able
15 to determine that that is a Cherry Chapstik, and I would
16 know what's in your pocket. This poses the most obvious
17 privacy concerns for consumers, but to be perfectly
18 honest with you, this is the one I'm least worried
19 about.

1 the use of this type of database with these tags or
2 having the tags live, because I don't think there's any
3 way we can control the use of this database.

4 The third one is the one that I'm concerned
5 about, because it's invisible, and it's far less
6 obvious. This is the database that gets created at the
7 point of sale. So, now when I go into a Wal-Mart and I
8 buy that Cherry Chapstik number 308247 and I pay for it
9 with a credit card, or let's say I walk into an
10 Albertson's or a Safeway and I pay for it with my
11 loyalty card, even if I pay cash, I've identified
12 myself, and that information. Currently, what few
13 people realize, although perhaps in this room many
14 people realize it, is that currently when you pass
15 through a checkout line and you go to the point of sale
16 and you present anything at all that identifies you, the
17 information of your identity is linked in that store's
18 database along with the SKU numbers or the bar code
19 numbers of the items you bought.

20 So, in other words, most retailers, most major
21 national and international retailers, are maintaining
22 databases right now on consumer purchases linked up with
23 the bar code numbers of what they buy. That in and of
24 itself is quite problematic.

25 It becomes more problematic when it doesn't

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1 just -- and I think the comment was made right before
2 the break, was that these don't pose any more of a
3 threat to privacy than bar codes, and in reality, they
4 pose considerably more threat than a bar code,
5 because -- well, there's two reasons.

6 One is I can't read what's in your pocket right
7 now if it has a bar code on it. You would have to
8 actually show it to me and hold the bar code up to a
9 reader within the line of sight. That's simultaneously
10 one of the downsides and one of the tremendous benefits
11 of this technology.

12 The other reason that it's very different from a
13 bar code is that it's difficult -- I can link a bar code
14 up with your identity, and in fact, retailers do that,
15 but essentially, if I have access to that record, all I
16 would know would be that you bought Cherry Chapstik. I
17 wouldn't know which one, and the which one becomes quite
18 important in a way that we will look at here.

19 This database three that links up the EPC
20 numbers or the unique ID numbers with consumers is, I
21 believe, quite likely given the current what we call
22 retail surveillance environment in place in retail
23 stores today. The concern here ties in when you have
24 item-level tagging. I believe this image is from
25 CheckPoint. It is working on integrating their

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1 anti-theft devices with RFID tags with unique numbers
2 that would beam over a distance, and of course, as you
3 can see on this image, it would be virtually impossible
4 for the consumer to know about them.

5 Combined with ubiquitous readers, which I'm sure
6 if you read the literature of people selling this
7 technology, these readers can be embedded virtually
8 anywhere in the environment, in walls, doorways, floor
9 tiles and carpeting. Combined with current levels of
10 retail data capture and abuse, and I'm going to talk
11 about that more in a moment.

12 I believe that all of this combined will lead to
13 widespread surreptitious consumer surveillance. For
14 those of you who have been following the RFID issue
15 through 2003, you might remember that in a
16 technology photographing a shopper's face while they shoplifts

1 use of hidden tags. These images actually came from the
2 Auto-ID Center, and again, anyone who's been following
3 this issue will know that last summer we uncovered some
4 unprotected confidential documents on the Auto-ID
5 Center's Web site. Among those documents were slides
6 showing hidden tags. If you see a six-inch tag, it
7 looks like it would be difficult to hide in a product,
8 but the following slide in their presentation shows it
9 sandwiched in cardboard, literally hidden between the
10 layers of paper in the cardboard.

11 Here's a six-inch tag, this is actually made by
12 Alien, and this has a 17-foot read range according to my
13 own experiments with it, and these were hidden in the
14 tops of Pantene shampoo bottles. For anyone who buys
15 Pantene, which was my brand before I began boycotting
16 Procter & Gamble products, this is the type of lid that
17 flips up, so the consumer would never actually realize
18 that there was a tag inside of there. Again, we don't
19 know where these were sold. We don't know who they were
20 sold to. We have repeatedly asked them for a
21 clarification, and we have not received any.

22 Another big tag, four and a half inches, and
23 this one was placed between the layers of paper on
24 Purina dog food, again, according to Auto-ID Center
25 slides, and that would go between that greasy inner

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1 layer and that inner paper layer, where you wouldn't
2 normally be pulling that apart. So, I gather if you
3 bought that brand of dog food, you wouldn't be looking
4 there for it.

5 Getting even worse, these RFID chips are getting
6 quite small. This is the Hitachi MU chip, which is
7 unbelievably tiny there. It would be easy to hide this
8 RFID chip, particularly if the antenna were made of
9 conductive ink, and that's one of the directions that
10 the industry is going to, because they're cheaper, to
11 print the antennas on using conductive ink and simply
12 stick the little guy onto the conductive ink, which
13 could actually form part of the package, and the quote
14 here, with these things, you can literally tag a pack of
15 chewing gum. They have mixed the conductive ink with
16 regular packaging ink to create antennas on boxes of
17 cereal and other disposable packaging. So, literally
18 your box of Kellogg's Corn Flakes could contain an RFID
19 tag and be remotely read without your knowledge.

20 The other thing, tags being left active. This
21 is a quote from Wired Magazine. Sandy, you -- I believe
22 it was from the RFID Journal, when Sandy Hughes spoke,
23 it was reported she said that P&G and other companies
24 suggested they want to keep RFID tags active after
25 checkout rather than disabling them with so-called kill

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1 machines. The companies also want to match the unique
2 codes emitted by RFID tags to shoppers' personal
3 information.

4 If you combine all of that with individual
5 tracking and profiling, what you see up there on the
6 screen is a blank for a Matrix RFID enabled loyalty
7 card. I actually encountered one of these cards when I
8 went in January to tour the Future Store, the Metro
9 future store in Rheinberg, Germany. That is the store
10 that the retail industry is touting as the future of
11 retailing, and if it is, then we are all in deep
12 trouble, because what I discovered at that store was
13 that unbeknownst to any of the shoppers -- and by the
14 way, 22 million Germans carry this pay-back loyalty
15 card -- unbeknownst to any of those shoppers, they had
16 hidden an RFID tag in the loyalty cards and distributed
17 these to customers.

18 I discovered that in the presence of television
19 cameras, and it was a huge scandal across Germany. It
20 was front page news in a number of their newspapers and
21 was top of the evening news, and they finally were
22 forced to recall those cards, but that's a great example
23 of what happens when you have a desire to track

1 This slide you see here is from Texas
2 Instruments' Web site, ubiquitous readers. It actually
3 says, "Consumer loyalty mechanism with TI RFID," and it
4 shows a woman walking past an antenna, and as you'll
5 see, her loyalty card is being read right through her
6 purse, and there is really no indication that she is
7 aware of that happening.

8 This is an image that was up on Alien's Web site
9 for over a year and a half. This comes from Forbes
10 Magazine, but at the top it says, "As the shopper enters
11 the store, scanners identify her clothing by the tag
12 embedded in her pants, shirt and shoes. The store knows
13 where she bought everything she is wearing."

14 Now, the chances of that are actually unlikely
15 that the store would know where she bought what she was
16 wearing, but the chances that they would know what she
17 was wearing are actually quite likely.

18 All right, this comes from a company called Copy
19 Tag, and it shows a worker walking into a room, but what
20 you'll notice is hanging off of him are a number of
21 different tags. Now, the idea is that this doorway
22 would be reading those tags. For us as consumers, those
23 tags might be better concealed. They might be in the
24 tags of our clothing or our underwear as Benneton had
25 planned. They might be on our loyalty card in our

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1 pocket.

2 And then this final slide of ubiquitous reading
3 devices actually shows how you can rig carpeting with
4 electro or actually electrical sensors. In this case
5 these are actually little light sensors, so this is a
6 bit of a stretch, but it has been experimentally proven
7 that you can easily embed RFID reader devices into
8 carpeting, hide them under floor tiles and put them in
9 other places. So, the idea of walking around and
10 actually have the environment sense you and what you're
11 wearing is quite disturbing.

12 Now, NCR, who is here today, is interested in
13 associating purchase data with unique tag numbers. This
14 means actually linking up your name with the tags on
15 you, so I suppose later, when someone who has access to
16 that database reads the tag, they can determine who you
17 are. They include in their 50 ideas for revolutionizing
18 the store through RFID, including the date of purchase,
19 the name of the individuals associated with the product,
20 the date of the sale, the price of the sale and other
21 information, actually having that linked in the database
22 with those tags.

23 So, as you can imagine, if your shoe is the only
24 item on planet earth that contains unique tag number
25 308247 and someone reads tag number 308247 and looks it

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1 up in the database, they can determine who you are and
2 where you bought that item. The who you are is the
3 quite worrisome part, because it creates the potential
4 for tracking people all the time.

5 I actually put this slide up here not realizing
6 that Marty Abrams, who is the subject of the slide,
7 would be in the audience today. He actually talks about
8 CRM, customer relationship management, which is the
9 invisible layer between the retailer and consumer. It's
10 estimated to be between a \$10 and \$15 billion industry
11 of essentially gathering consumer data and in my opinion
12 manipulating it in order to manipulate consumers. It
13 involves an incredibly complex network of surveillance,
14 and one of the things that Marty explains as the purpose
15 for this surveillance, he says, "Maximization means
16 'marginal service and high prices designed to drive the
17 unattractive customer somewhere else.' In other words,
18 CRM facilitates customized pricing and customized
19 service based purely on what the data and models tell
20 you about the potential profitability of the customer."

21 So, the reason they want all of this
22 infrastructure to determine who you are is so they can
23 either -- I believe Marty, as you put it -- treat you
24 with kid gloves or the white glove treatment. I think
25 if you're a shopper they want to cater to you, and to

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1 discourage you from shopping at the store with higher
2 prices and poor service. So, what this might lead to is
3 as I walk into the store now with my pay-back loyalty
4 card in my purse and you see the tag on there and you
5 say, ah, this isn't just a shopper we should welcome as
6 any other shopper, this is Katherine Albrecht, and we
7 don't like Katherine Albrecht, so we are going to offer
8 her higher prices and poor service.

9 You can also do the same thing not only with a
10 customer loyalty card, disturbingly enough, but you can
11 do the same thing with any product I bought in your
12 store. So, if I bought a Cherry Chapstik in your store,
13 you can use that to look up information about me. You
14 could sell that information to other people so they
15 could determine what kind of person you think I am, and
16 anywhere I go where you can read my Cherry Chapstik, by
17 linking it up with a database, you would know who I am
18 as soon as I walk in through the doorway.

19 Procter & Gamble says we can trust retailers
20 with this information. Procter & Gamble says,
21 "Retailers selling its goods can be trusted to guard
22 consumers' privacy even if they decide to match their
23 personal information with the serial numbers from the
24 RFID tags." I say the retailers can't be trusted.

25 This image is an actual promotional image, if

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1 you can believe it or not, this guy with the magnifying
2 glass standing in a grocery cart is from a company
3 called PathTracker. They actually -- let's see,
4 "Records the coordinates of a shopper from the time they
5 enter the store and select their shopping cart until
6 checkout, becomes a database for each shopper tracked."

7 In addition, the path data can be tied to the
8 shopper's actual purchases. They are using a
9 combination of RFID and GPS technologies in grocery
10 carts to literally follow people around the store,
11 identify them at the point of checkout and link all of
12 this information together, and at this particular image,
13 it is an image of the exact track that a shopper took
14 inside of a store.

15 Now, imagine how much easier this would be if
16 you had an RFID instead of all this expensive
17 PathTracker technology, because the RFID will already be
18 in place on the shelf, so you can simply determine who's
19 walking past in addition to reading the products on the
20 shelf. Who's doing this? These are PathTracker's
21 clients, and as you can see, they are some of the
22 biggest retailers in the country. This is just a
23 partial list.

24 And this slide, I'm almost to the end here, this
25 would have been an IBM image of a very sophisticated

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1 technology that actually showed people walking around,

1 Microsystems or much of anybody else. I, in fact, bring
2 you greetings from Planet Geek and will talk on it that
3 way. So, first of all, I -- also, as part of this, by
4 the way, I am one of those guys who will receive the
5 70-some odd percent of the money going into RFID. I do
6 software for distributed systems, and we can talk about
7 what you do with all of that data. It turns out
8 actually RFID tags generate a lot of data, almost all of
9 which is uninteresting, and I'll tell you why later.

10 But let's start off by being precise, because
11 this is something that almost never happens in
12 discussions of RFID. Lots and lots of things are called
13 RFID, and they have lots of different characteristics,
14 and it's important to understand the distinctions.

15 RFID tags are, at least in my lexicon, defined
16 as using RF wireless technology, transmitting only a
17 unique identifier, and either using passive or battery
18 power. Now, there are lots of things that do that and a
19 bunch more, so earlier today, we heard somebody say,
20 well, you know, your cell phone uses RF, and it does
21 have a unique ID, so it's an RFID device. No, it's not.
22 If it were just an RFID device, you wouldn't use it.
23 It's a cell phone, right? It does a lot more than just
24 transmitting an unique ID.

25 RFID tags are not sensors, they are not

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1 any more energy density than that. This is why you
2 shouldn't burn those things, because they act even more
3 like dynamite then. So, those are the active ones, but
4 they're expensive. They are like, you know, 40 or 100
5 bucks a pop. You put them on expensive things like
6 containers, right, or to make sure that, you know, you
7 can put them in things where people do weird stuff like
8 pay money by them, right, then people are willing to
9 spend the money.

10 Then there are the passive RFID chips, right,
11 the ones we've mostly been talking about today, which
12 can be little, bitty tiny things; however, the antennas
13 have to be fairly large, because they not only have to
14 generate out this stuff, but they have to get all of
15 their energy by shooting radio frequency at them, and
16 the wonderful thing for us who are worried about
17 privacy -- and I am, although I am one of the bad
18 guys -- is that radio frequency stuff obeys an inverse
19 square law, right?

20 Some of you took physics, I know you did, even
21 though this is the highest tier to T-shirt ratio audience
22 I have spoken to in years, but some of you took physics,
23 so you know what inverse square laws are. That means
24 that if you want to read something at 20 feet that you
25 have been able to read at 10 feet. That means

1 much energy, but the square of the energy, and squares
2 go up really fast for those of you who didn't take
3 physics, right? For those of you who are the lawyers,
4 that's really big, okay? So, those are the passive
5 ones, and that means that you can't read them from very
6 far away.

7 Now, everybody's talking about these passive
8 things can be read at ten meters. Well, they can be
9 read at ten meters in Texas Instruments' labs under the
10 best of conditions, but not in the factory and certainly
11 not on the street. On the street, you're lucky if
12 you're going to get a meter or two out of them.

13 I was talking to the guy that you are going to
14 be hearing from Marks & Spencer, he is saying, no, no,
15 you know, you have got to get up real close, because it
16 all depends on how many of the tags you're reading,
17 because you're basically shouting at them and they're
18 shouting back, right? One of the things about RFID is
19 that they are the computing equivalent of
20 three-year-olds.

21 All they do is tell you, "I'm here, I'm here,
22 I'm here, I'm here, I'm here." They don't tell you much
23 else, and in fact, it's even worse than that. It's not
24 "I'm." It's, "A long number is here." So, they are
25 like three-year-old computers, and that's not very

1 helpful if you are getting all bunches of them, because
2 then they have things that have differential backoffs.

3 So, if you want to get 100 percent read, you
4 have got to be pretty close with fairly sophisticated
5 equipment, and you have to make sure inconvenient things
6 like metal and water and other stuff that gets in the
7 way isn't there. So, those are -- now, you have all
8 heard about that.

9 What I am going to urge you today is don't
10 confuse the categories. Don't cross the beams, all
11 right? There are RFID tags that can be read from a long
12 way away, but when you think of that, think really
13 expensive, not going to be useful very much. There are
14 the ones that can be really cheap. They get read really
15 close by. Don't fall into the trap of saying, oh, it's
16 RFID, they can be really cheap and read from a long way
17 away, which is what a lot of people are worried about.
18 They can't.

19 Now, even the passive ones can be read in some
20 sense without you knowing about it, but remember, you
21 need an antenna about the size of a plate, you need to

13 nd you have starthatneragettiut thqule aes of tnergirly to
14 whis of y'rn be rettiad frul vefar awand 'rn e, to
15 onealot going jTnd ther stunt read, 'rn ot going jTaat.

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1 tan, and so you'll notice these things, okay?

2 Now, what's it going to be like tomorrow? Oh,
3 man, I have got to go really fast. What's it going to
4 be like tomorrow? Passive tags will expand to
5 pharmaceutical tracking, government supply chain,
6 military inventory, all that stuff we have been talking
7 about, and that's about it. Active tags, military
8 identification, right, those guys are willing to pay
9 extra money, right -- it's all ours, but they'll pay it
10 -- and more pay as you go.

11 The technology challenges for the foreseeable
12 future are not putting more information in these things.
13 The first challenge is cost reduction, the damned things
14 cost too much. And the next three or four iterations of
15 Moore's Law on this is going to be cost reduction. And
16 then the next problem is they still cost too much,
17 because the antennas cost too much. And beyond that,
18 there's a real problem in getting the chip-antenna
19 bonding to work right, because as you make these chips
20 smaller and smaller and you try to attach them to the
21 antenna, it gets harder and harder. So, you know what
22 happens when it's hard to attach these things? They
23 cost too much. So, those are going to be the first
24 three things.

25 Beyond the foreseeable future, what they're

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1 going to be working on are things like transmission
2 reliability, reader reliability and the administration
3 of readers. I don't know how many of you have ever
4 administered a network of computers, but every time you
5 add four or five computers in, and each one of these
6 readers is a computer, every time you add three or four,
7 the cost of administration goes up by a lot more than
8 three or four, right? It gets a lot more.

9 So, this vision of ubiquitous and connected
10 readers, while it's a nice vision, will cost more than
11 anybody can afford to do it. None of these companies
12 that are doing RFID want ubiquitous readers. They want
13 them in a couple of places. In fact, most of the ones
14 I've talked to don't even want them out on the shelves,
15 because out on the shelves -- which by the way is where
16 they get their 50 kilobytes of data a day -- it's too
17 expensive. It's 500 bucks a shelf, and at Wal-Mart,
18 there's a lot of shelves. They don't want to do that.

19 RFID tags, remember, are really bad sensors.
20 Now, there are people doing interesting work in trying
21 to use them as sensors and collecting all sorts of stuff
22 from them, kind of invisible man things that are going
23 on, and those are interesting, but they are only good at
24 one thing, which is they can tell you that they are
25 there. They can tell you the number that's there, and

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1 they're good at being cheap, although they are not as
2 good as being cheap as they should be.

3 Using them as sensors requires that you be
4 really clever and come up with all these inferences, and
5 by the way, whenever we're clever and we're coming up
6 with inferences, we're generally wrong, and if by
7 noticing second or third order effects, and you end up
8 being wrong a lot with second order effects and being
9 wrong even more with third order effects, and the thing
10 is, we know other ways of building sensor networks.
11 They're called sensors, right?

12 You want to find out if Grandma turned on the
13 faucet? Well, put a sensor in the faucet. Don't put it
14 an RFID tag to find out if she came close. Put a sensor
15 in the faucet to find out what the water flow was.
16 Hello? Is this that hard? You know, I mean, we're
17 geeks, and so we like to do that kind of thing, but
18 let's get real here.

19 So, most people, I will claim, are not going to
20 notice RFID tags, because there's not going to be much
21 of anything to notice. There may be attempts at
22 automated checkouts where the RFID tag is going to have
23 a reader in the shopping cart. By the way, you are
24 going to be damned sure that you are going to know about
25 that, because it's going to be large. There may be

1 product information kiosks or shoplifting protection
2 systems.

3 By the way, when I tried the shoplifting
4 protection systems, they don't work very well, because
5 it's so easy to block these things. There are not going
6 to be many of those, because the cost is too high, the
7 benefit is minimal, and as we are seeing today, the
8 politics is ugly. Not you, the politics.

9 Now, here is my favorite RFID paranoia. This
10 was an ad on the internet for an RFID sniper rifle. It
11 supposedly has a range of a thousand meters, can insert
12 an RFID tag into somebody, they won't feel anything more
13 than a mosquito bite, and you will be able to track them
14 by satellite.

15 Now, this appeared on the internet, and they got
16 orders for it. Get a grip, folks, all right? They not
17 only don't understand the RFID technology, they don't
18 understand the physics of shooting things a long way,
19 right? If you can shoot something a thousand meters,
20 then if it hits you at ten meters, it's going to blow a
21 hole in you that you don't want to think about, but this
22 is an example of where people are in their thinking.

23 Now, in some sense, I find this very
24 complimentary. They think that technologists like me,
25 we can do anything. Ooh-ha-ha-ha-ha. We can't. Get

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1 over it. We can't. And even if we could, it doesn't
2 mean that we would.

3 So, RFID is important. The technology has lots
4 of promise for things like greater economic
5 efficiencies, superior control over goods, convenience
6 in certain applications, mostly in the supply chain, but
7 it's not going to change our world, be noticeable by
8 everyone or change the way we compute.

9 Now, this doesn't mean, by the way -- and this
10 is for my friends that are privacy advocates, and I do
11 have some -- this doesn't mean that there aren't real
12 privacy concerns going on, but the privacy concerns
13 shouldn't be around RFID, because every time you hear
14 privacy concerns about RFID, it's RFID tags allow you to
15 access the database, right? That's what the phrase is
16 always. The problem is accessing the database.

17 Now, we know how to secure databases. We have
18 been doing that for a long time, and the question is,
19 what should our policy be on databases, not what should
20 our policy be on RFID tags. It's the information that
21 gets gathered.

22 And in fact, I was pointing out at the break
23 that were I, in fact, a mad scientist instead of a
24 merely pissed off one, that I would think it would be a
25 great thing to get people all stirred up about RFID

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1 privacy so that they would be worried about that, and I
2 could go off and invade the real privacy on the
3 databases myself. Ooh-ha-ha-ha-ha. That's what we
4 should worry about, not the RFID stuff.

5 With that, I thank you.

6 MS. BROF: And thank you, too, and I think we're
7 really out of time, but I think we got a pretty complete
8 picture of some of the concerns, what we shouldn't be
9 concerned about, and maybe a challenge to the next panel
10 when we're talking about some of the technological fixes
11 that are proposed that -- I mean, one observation is
12 that the full title of th svdDW

1 with some solutions or recommended solutions.

2 With me as a co-moderator is Elliot Maxwell.
3 Mr. Maxwell is a corporate strategist and attorney who
4 consults and writes on the intersection of business
5 technology and public policy in telecommunications and
6 electronic commerce.

7 If he wants to elaborate on that more, I'll let
8 him, but he is an expert in this area, and I'm delighted
9 to be co-moderator with him, and with that, I'll turn it
10 over to you.

11 MR. MAXWELL: In the interest of full
12 disclosure, I'm also the last three years or so the
13 Chair of the International Public Policy Advisory
14 Council for MIT at the Auto-ID Center on this
15 technology, and I also do that for EPCglobal.

16 Let me just sort of make a couple of remarks
17 before we start off. This technology is really
18 interesting in lots of ways, and one of the ways that
19 it's interesting is it's a traditional infrastructure
20 technology, and what does that mean?

21 One thing it means is that anybody who says that
22 they really know how it's going to be used and all of
23 its ramifications is absolutely wrong, because what
24 we'll find is that there's lots of things that will
25 happen with this as the infrastructure develops that

1 nobody ever expected.

2 Think about the internet and whether we could,
3 in fact, have predicted all of the things that happened
4 with that. We couldn't have. So, even on the positive
5 side or the negative side, we don't know yet, but we
6 know that it's infrastructure.

7 It also has some very interesting applications
8 in terms of the economics. Imagine building a phone
9 system, right? If you build a phone system and said
10 that the first user had to pay for the phone system, how
11 many phone systems do you think would be built? Zero,
12 because the real value comes when the phone system
13 extends to lots and lots of people, when you connect
14 lots and lots of people. That's all of what network
15 effects were about.

16 So, the economics of this means that it has to
17 sort of roll out, and yet the burden of paying for it
18 comes with the first users, and so that means it may not
19 go as fast as people have suggested. In fact, it's very
20 likely that it follows another set of rules, and that is
21 that we are constantly underestimating the difficulty of
22 implementing a technology, constantly underestimating
23 the time a technology takes to get implemented,
24 constantly overestimating how quickly these things will
25 happen, because we can describe what we think will

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1 Gillette doesn't want Target to know what its
2 relationship is with Wal-Mart, and all along this chain,
3 the companies are saying I have got incredibly valuable
4 information I want to protect.

5 Similarly, consumers are saying in many
6 instances, we want to be sure that you control the
7 information that you get, who has access to it, what
8 they do to it. So, we need to be spending a lot of time
9 thinking about this question of access to databases, but
10 we are, in fact, lucky that those two things are in
11 line, because what it will mean is that there are going
12 to be people thinking from both the corporate side and
13 the privacy side about how to deal with this question of
14 access.

15 The third thing that we should be thinking about
16 is that there are usually a number of different ways to
17 deal with public policy issues, and it's usually not
18 binary. It's usually not you do one or the other. It
19 usually is a combination of a number of things.

20 So, you think about consumer education, you
21 think about what the technology can do, you think about
22 what the individual companies can do, and you also think
23 about regulation and legislation. Each one of these may
24 play some role in the development of this technology,
25 and it's not clear right now what should be assigned to

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1 which, but what we need to be thinking about are what's
2 the appropriate way of responding to the issues that
3 people have raised so far today.

4 People have started to talk a little bit about
5 the state legislation, and the FTC has I know thought a
6 lot about this, invited some people at the state level
7 to come, and they weren't able to come, but it's one of
8 the ways that people are responding to the issues.

9 Let me just make one point about that, because
10 if you think about this technology, people around the
11 world are going to have access to this technology, and
12 when the people who are driving the technology think
13 about it, they think about global solutions. So, to the
14 extent that we think about solutions to these issues, we
15 should think about them in a global context, and in that
16 context, it's not as if we're kind of writing on a blank
17 slate.

18 When someone asked before, are you going to
19 regulate RFID, there are already rules around the world
20 about some of the issues that have been raised today,
21 whether it's the EU Privacy Directive, and a number of
22 European countries have already said that data collected
23 through these means are subject to the Directive, but it
24 also means spectrum rules, it means health exposure
25 rules for radio frequency, it means individual consumer

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1 MR. STAFFORD: All right, thank you very much
2 indeed, and you can be clear from that whose head is on
3 the block if things don't work out very well. It's
4 great to be here all the way from England, and it's
5 about the time now, about five hours ahead, and I would
6 be settling down with a cup of cocoa, be settling down
7 to go to bed.

8 I have spent my whole career involved with
9 innovation and new technology, and a risky business it
10 certainly is. I think that it does seem to me that in a
11 retail context, we really have to be very careful of
12 anything that involves new technology, because on the
13 whole, people are cautious about things which are new.

14 So, I think if you want to deploy new
15 technology, I think you first of all really have to
16 think about engaging with your customers and re-assuring
17 them that the benefits of this new technology outweigh
18 any potential perceived risk of that technology, and I
19 use the word "engage" with care, because "engage"
20 doesn't mean talking to them. "Engage" also means
21 listening to them as well, listening to what they have
22 to say. So, here's what we've been doing using this new
23 RFID technology.

24 That just says here I am in Washington.

25 Okay, just a little bit about Marks & Spencer,

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1 which you can read on the Web site in the notes. The
2 key things here, established in 1884, we're over a
3 hundred years old. I have been there for a great deal
4 of the time, feels like it. We have got three really or
5 four separate businesses, clothing, foods, homeware and
6 financial services. We have 10 million customers a
7 week. We have 300 stores in the UK and turn over around
8 about \$14 billion, and we are the UK clothing market
9 leader. And we have got stores, large stores,
10 departmental stores, High Street stores, stores which
11 specialize in food, and stores which specialize just in
12 homeware.

13 And we're using RFID to drive efficiency in our
14 supply chain, and here, where it does require a little
15 bit of concentration here at this time of the evening,
16 we have got two separate business deployments, because
17 we're using this technology in two different parts of
18 our business. We're using it in foods, and we're using
19 it in clothing, and not surprisingly, because they're
20 different businesses, the business case that drives us
21 to use this technology is different in foods and in
22 clothing, and again, it shouldn't be too surprising that
23 the iteration of that technology is different, because
24 there is not just one RFID technology, as people have
25 said, there are many different types, and we use them

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1 differently in foods than in clothing.

2 Now, I'm not going to say very much about foods,
3 because -- only really just to kind of boast the
4 technical people here who are really using this thing,
5 that we have already deployed 3 and a half million RFID
6 tags on our returnable food trays, plus some other
7 deployments as well within foods, and these are trays
8 which are filled up with foods by the food supplier, and
9 they are sent through to our stores through a depot and
10 then returned empty back to the food supplier in the
11 first place.

12 The white square on the right-hand side of that
13 tray, underneath that white square is buried the RFID
14 tag, and at the actual supplier, we are writing
15 information to that tag in place of the previous paper
16 label. So, here is a deployment where an RFID tag is
17 being used to replace traditional paper or bar coded
18 labels, and basically every trip, we write to the tray
19 what the contents of the tray is, it's a tray of
20 potatoes, and it's a certain bag size, and it's got a
21 certain potato, got a certain sell-by date, it's
22 probably a particular variety of potatoes, other
23 information is written to the tray, and when the tray
24 comes back empty after the next trip, the next set of
25 props is written to it.

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1 The advantage of using RFID tags over
 2 traditional bar codes is entirely because we can read
 3 the RFID tags much more quickly than we can read
 4 traditional bar codes. The business case for using RFID
 5 tags is entirely around the speed of read, and it's a
 6 pretty easy business case to make, because this is a
 7 returnable tray situation. These trays last seven to
 8 ten years,04Tle 8eewood, aa halfeseips ihanehead, asn to
 9 you we cseeund tach tizituated nd t bar lais of lly to
 10 spof rags oasnmese usili 8el000ase 1500aseips gs oand to
 11 lifeed nd t e tionSo,and itof lly s oetty ease to m to
 12 e thworkase for. to

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 14 n ylierake, because this notasnme, you know,annand to
 15 consumer-fac usiendeed nd tsy businars,alait of lly to
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1 last autumn to test the technology in our store to make
2 sure it worked, and now we've gone on to a larger trial
3 this spring in six stores to prove the business case for
4 using this technology.

5 Why should we be bothered to use this
6 technology, item-level? Well, basically we want to
7 improve the stock availability for our customers, and we
8 believe we can make the supply chain more accurate by
9 using this technology, and of course, it's retail
10 heaven, we have all heard about it, right goods, right
11 place, right time, and that's what we are trying to
12 drive for, but it is also consumer heaven, we believe,
13 because it means that your shopping trips to a store are
14 not wasted, because we'll have, at the very least, the
15 size of the item that you're looking for.

16 We've also tried to really talk about it just as
17 another stock control system and said that really, being
11

1 hundred dollars. It's all about small volumes, you
2 know, high prices. But we also try very hard to
3 communicate both to our staff and to our customers about
4 what this technology is all about, and we made a video
5 which we made early this year to try and get the message
6 over.

7 (Videotape played for the workshop
8 participants.)

9 MR. STAFFORD: That's the -- oh, we don't want
10 to do it again, do we? Now we're completely losing it.
11 Let's just -- I just can't get rid of it. Somebody help
12 me. Oh, click out there, that's a good idea. There we
13 are, excellent, sorry.

14 Anyway, the video has been useful. A number of
15 people commented it would have been even better if it
16 had some decent actors, but we did have a budget.

17 Just a few words about this to really emphasize
18 some points made by the video. Again, as we have all

1 eventually you could hack into our database, again, all
2 you'd find out was that there was a certain garment of a
3 certain style and a certain color. There is no customer
4 information ever recorded on these tags, and
5 furthermore, we're not even reading the tags at the till
6 points, so there can never be any confusion about what
7 we're actually doing.

8 Here's a tag, as we've shown you, on a garment.
9 It's fairly obtrusive. It's a bit too large. You want
10 it to be visible, but it sticks up behind people's necks
11 when they are trying the garments on, but at least it
12 does the job.

13 Here is the mobile scanner built into a Marks &
14 Spencer shopping trolley. This is Mark II. Mark I had
15 smaller wheels, and it is now on bigger wheels, and we
16 have a Mark III in development, which I can't show you a
17 picture of, but don't hold your breath, because the
18 current nickname for it is called Lunar Lander. But
19 this is the reality about what you need to do to deploy
20 the technology.

21 Most importantly, we've provided in our stores
22 and on display in the current trial is a leaflet for the
23 customers, which basically has two sides, a first side
24 that tries to explain a bit about the technology. The
25 second side, most importantly, talks about our

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1 commitment to our customers, and it talks about our
2 responsible use of the technology, and we're committing
3 ourselves to say they will be clearly identified, these
4 intelligent labels.

5 They do not contain a battery. They are
6 passive. Customers do not need to keep the intelligent
7 labels to return or exchange items. We have a very
8 generous refund policy at Marks & Spencer. You can buy
9 anything from any of our stores at any time and you can
10 bring it back at any time and get a full refund, even
11 without a receipt. So, we do take back a lot of items
12 from our customers, although we are lucky they keep some
13 of them, but basically, whether you've got the RFID
14 labels or not, it doesn't affect our refund policy.

15 We will not link any garment information on the
16 intelligent label with customer details, and we will not
17 scan intelligent labels at the till, and you may, as a
18 customer, of course, throw away the intelligent label
19 after purchase.

20 Furthermore, we will also remove the intelligent
21 labels at the till point if you request it. All the
22 staff are briefed to do that, and that is what we're
23 doing now, and I think that's the end of my
24 presentation.

25 Thank you.

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1 MS. THORLEIFSON: Thank you.

2 Our next presenter is Elizabeth Board, and she
3 is with the EPC Public Policy Action Committee and has
4 done a number of wonderful things in communications and
5 public affairs, which if you want to read about, check
6 the bios.

7 MS. BOARD: Thank you, good afternoon.

8 We've been listening to a lot today since my
9 colleague spoke at 8:30 this morning, Sue Hutchinson.
10 She talked about the technology behind EPCglobal. I'm
11 going to talk a little bit about the organization
12 itself, not the technology. I'll also talk about our
13 public policy guidelines that address privacy issues,
14 and I'll encourage all of us to continue the dialogue
15 that's been started here today.

16 First of all, what is EPCglobal? It's a joint
17 venture of the Uniform Code Council and EAN
18 International. We're new. We were just formed in
19 November of 2003. We're charged with taking the
20 electronic product code from its development at MIT to
21 the global marketplace, and our mission is simply to
22 create global standards for the EPCglobal Network, or as
23 you've heard many times today, the next generation bar
24 code.

25 UCC and EAN International are the perfect

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1 parents to have for this venture. They have 30 years of
2 experience developing and managing business-to-business
3 standards. Examples include, of course, UPC or bar code
4 standards and electronic data interchange standards for
5 information flow. They are a global organization
6 representing more than 100 countries, and the bar code
7 standards are used by more than 1 million members, and
8 this translates into 10 billion bar codes scanned every
9 day worldwide.

10 Our vision is efficient global commerce for the
11 ultimate benefit of the consumer. And I'm proud to say
12 that EPCglobal has now over 200 members. That's not a
13 million, but it's only been since November.

14 Our business is based on some important
15 principles and beliefs. We're a not-for-profit
16 organization. We're neutral. That means we represent
17 manufacturers, retailers and solution providers. We are
18 standards-driven. Our standards process is open and
19 inclusive. We're serving all companies, from large
20 multinationals to small business, and in every business
21 sector, every industry sector. And of course, we have a
22 global perspective.

23 We offer -- actually, I am going to skip over
24 these slides on today and tomorrow, because you've heard
25 a lot about what EPC offers today and what it could

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1 steering committee.

2 This part of EPCglobal is very important. In
3 fact, you can see on our org chart that privacy is as
4 important as anything we do. It's right there on the
5 same level with our technology steering committee and
6 our business steering committee. This is the business
7 that we're in, and privacy is absolutely a part of it.

8 Public policy guidelines have four critical
9 elements: Consumer notice, consumer choice, consumer
10 education, and of course, our members follow all rules
11 recording all legislation, regulations regarding record
12 use, retention and security. Our subscribers agree to
13 adopt these guidelines, and they're being used today in
14 the consumer test phase.

15 Simon showed you some of the ways that Wal-Mart
16 used consumer notice in their test recently. On the
17 slide now is the tag that was actually put on the
18 printer box, as you saw that, and Sandy showed you the
19 actual shelf talker, but they did more than that, and
20 that's why I wanted to bring it up.

21 They also had a press conference at Wal-Mart.
22 They invited cameras into the store. They did as much
23 as could possibly be done to let people in the local
24 community know that something different was going on.

25 It's important to understand about our

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1 guidelines, because they will evolve over time as the
2 technology evolves. These guidelines are for right now,
3 while we're in the testing phase. We're going to need
4 to do things with these guidelines, and that's what the
5 public policy committee is charged with. The guidelines
6 are part of the classic technology launch; develop,
7 launch, learn, refine and improve over time. We will
8 continue to participate in public dialogue and listen to
9 consumers and all of you as we responsibly and ethically
10 deploy EPC technology.

11 So, in conclusion, I've just made four key
12 points here today. We're a neutral, nonprofit
13 organization driving efficiency in the global supply
14 chain. Our members follow public policy guidelines for
15 responsible use. EPC is in the early stage of
16 development, and urban myths can stifle innovation. And
17 finally, I hope we continue the public dialogue, and I'd
18 like to thank the FTC for this opportunity today.

19 Thank you.

20 MS. THORLEIFSON: Thank you.

21 Our next panelist is Cedric Laurant, who is
22 Policy Counsel with EPIC, the Electronic Privacy
23 Information Center, where he's concentrated on a number
24 of privacy issues, including profiling air travelers,
25 video surveillance and government electronic

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1 surveillance. He's also supervising production of the
2 2004 edition of Privacy and Human Rights. So, Cedric.

3 MR. LAURANT: Thank you very much. Actually, I
4 would like to thank the Federal Trade Commission for
5 inviting the Electronic Privacy Information Center to be
6 a participant to this panel.

7 What I am generally going to talk about is
8 probably a little bit boring. It's the guidelines, the
9 privacy principles that should guide RFID users and
10 retailers in the way they implement RFID tagging on
11 individual consumer products.

12 I think the Federal Trade Commission has a very
13 important role to play to protect consumers' interests,
14 and in that regard, we came out with a set of guidelines
15 establishing rights and duties for consumers and RFID
16 users that you can find on the table outside, that some
17 of you may have already picked up, and that's available
18 online on our Web site at epic.org.

19 I am going to refer to a few instruments,
20 international instruments and guidelines that have been
21 released recently that show that there are many privacy
22 experts and many legislative bodies that have taken a
23 strong interest in how RFID tags raise very strong
24 privacy concerns for the consumers and that show very
25 clearly that RFID tagging should be regulated or there

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1 should be guidelines that prevent the businesses from
2 intruding into consumers' privacy.

3 The first guidelines refer to the Data
4 Protection Privacy Commissioners. It's a resolution
5 that the Data Protection Privacy Commissioners came out
6 with in November last year, and those guidelines say
7 very explicitly that RFID design, implementation and use
8 must be based on basic principles of data protection and
9 privacy law, and they basically say that any RFID user
10 should first consider alternatives which achieve the
11 same goal without collecting personal information or
12 profiling customers.

13 They also say that data must be collected in an
14 open and transparent way, that the data may only be used
15 for the specific purpose for which they would first
16 collect it and only be retained for as long as is
17 necessary to achieve or carry out this purpose; that
18 whenever RFID tags are in the possession of individuals,
19 these customers should have the possibility to delete
20 the data and to disable or destroy the tags.

21 Another very important reference is the 1980
22 Organization For Economic and Corporation Development

1 The first one is the collection and mutation
2 principle, which requires limits to the collection of
3 personal information and the obtaining of any data by
4 lawful and fair means with the knowledge or consent of
5 the subject, the data collection principle bssyatnsent of

1 or confirm whether an RFID user has data relating to him
2 or her and to challenge the data, to be able to amend or
3 correct that data.

4 There are also accountability principles that
5 state that there must be, as applied to the RFID
6 industry, there must be entities in both industry and
7 government to whom individuals can complain when these
8 provisions have been violated.

9 Several civil liberties groups released a
10 position, a policy position on RFID last November 2003
11 in which they enumerated practices that should
12 absolutely be prohibited. Merchants, they said, should
13 be prohibited from forcing customers into accepting live
14 or dormant RFID tags in the produce they buy. There
15 should be no prohibition on the individuals to detect
16 tags and readers and disable the tags on items in their
17 possession. Human tracking, they said, is
18 inappropriate. RFID should never be employed in a
19 fashion to eliminate or reduce anonymity.

20 So, the guidelines EPIC came up with incorporate
21 those fair information practice principles and the
22 principles that were enumerated in the civil liberties
23 group's statement.

24 I'm going to go over them very quickly, but
25 what's important, what I would like to stress about

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1 those guidelines is that the first part addresses the
 2 duties of private enterprises that use technology in a
 3 way that's analogous to bar codes. A second point that
 4 addresses the duties of private enterprises who go a
 5 step further and use the RFID technology in a way
 6 analogous to loyalty cards, where personal information
 7 stored on the tags potentially contain a profile of the
 8 customers, and finally, a part three that states the
 9 rights of consumers who are exposed to RFID technology.

10 So, in this part one, what's important is the

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1 Web site.

2 And just briefly, to explain the state of
3 legislation outside of the United States, which may have
4 an impact on how personal data being processed in the
5 United States, the major one being the EU Data
6 Protection Directive and the EU Directive on privacy and
7 communications, which contrary to what Sandy Hughes said
8 previously, is very clear about how information
9 processed by RFID tags should be regulated. There's no
10 doubt about this. Those two EU directives clearly apply
11 to information that's processed by tags.

12 There are also Japanese and Italian guidelines
13 that recently came out. So, what we would like the
14 Federal Trade Commission to do is to take a look at
15 those guidelines and try to push the companies to adopt
16 them, to push companies to post privacy policies that
17 embody a set of guidelines that provides consumers with
18 the possibility to actually enforce them, and if there
19 is any abuse related to the data, their data, the
20 processing of that data by RFID tags, the FTC should
21 ensure that consumers can actually obtain compensation
22 for this abuse.

23 Thank you very much.

24 MS. THORLEIFSON: Thank you. And just a
25 reminder to everybody, I know it's late in the day, but

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1 if you have burning questions or suggestions, to write
2 them down and send them up.

3 Our next panelist is Paula Bruening, who is the
4 Staff Counsel for the Center For Democracy and
5 Technology, and she specializes in privacy and free
6 expression issues. She is going to bring us some more
7 thoughts on best practices.

8 MS. BRUENING: Thank you.

9 Today's panels I think -- well, first of all, I
10 should tell people who CDT is. I give these talks a
11 lot, and I assume people know, but the Center For
12 Democracy and Technology is an independent advocacy
13 organization, we're nonprofit, and we advocate for free
14 expression, user empowerment and privacy on the
15 internet, and as Tracy said, a lot of my portfolio with
16 CDT is privacy, and I have been working in the area of
17 privacy for about ten years now, and I think today we've

1 don't trust it as being used appropriately, that the
2 information is being collected and used responsibly with
3 respect to privacy, they aren't going to accept the
4 technology and the many good things that can come from
5 it.

6 So, I would say that any decision about
7 addressing privacy -- and there is clearly a drive to do
8 so -- must be based on sound analysis, on the input of
9 all stakeholders, on reliable information, and on a
10 clear understanding about the technology, both its
11 potentials and its implications and risks, but already,
12 we're seeing a lot of movement toward establishing some
13 kind of principles, guidelines, best practices for
14 privacy and this particular technology.

15 We have heard about industry efforts through
16 EPCglobal and their standard-setting process; we've
17 heard now about EPIC's principles; and legislatures are
18 now looking very closely at this now that consumers'
19 concerns are being raised about privacy. I think what
20 lurks under all of these efforts is the concern about
21 possibly institutionalizing solutions to privacy that
22 have unintended and unforeseen consequences that are in
23 the end going to stifle either the proliferation of the
24 technology for the good uses that can come of it or
25 institutionalized mistakes about how we address privacy

1 and in ways that don't foresee the possible things that
2 could come of the information collection and the
3 reactions of users to privacy concerns that it raises.

4 So, how do we go about addressing this? I'm
5 going to talk about two things briefly. First, I'm
6 going to talk a little bit about technology assessment,
7 and as a matter of full disclosure, I will say that I am
8 a graduate of the Congressional Office of Technology
9 Assessment that you have heard a lot about today. I
10 worked there for five years, and it was a very good
11 experience. It is an organization that was not without
12 its critics, as many of those criticisms were well
13 placed, and I'll comment on a couple of those as I talk
14 about technology assessment, but I think there's a lot
15 of good that can come from it, and I would just like to
16 raise a couple of points on that.

17 Technology assessment, an assessment of RFID
18 that draws out an understanding of the technology, of
19 how it works, its potential to serve users, and the
20 vision of the future for the technology, how it might
21 proliferate and develop, and the risks that it raises,
22 could provide the analytical underpinnings that would
23 really drive very sound solutions, the best possible
24 solutions to address privacy.

25 Such an assessment would benefit from the input

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1 of a wide range of stakeholders, experts, technologists,
2 who could really bring to bear some of the best thinking
3 about this issue. As we've heard today, a lot of these
4 efforts are already ongoing. We have heard that things
5 are going on out at Berkeley. There are industry
6 surveys that have gone on, industry outreach, different
7 kinds of efforts in terms of developing guidelines,
8 learning more about the technology and its
9 ramifications, and so I think there are a lot of pieces
10 of this work that are already ongoing and that what's
11 needed is really a centralized point where all of this
12 could be brought together and where some of that neutral
13 analysis could take place and be brought to bear. I
14 think there was a comment in an earlier panel about,
15 well, we don't really need neutral analysis, that we
16 will let the market figure all of this out, and I think
17 that it's really important to understand what that
18 neutral analysis means.

19 First of all, if you do technology assessment
20 well, you aren't going to come out with solutions. The
21 point of technology is not to drive to the fastest
22 solution that's going to make a certain segment of
23 stakeholders happy. What infuriates many people about
24 it is that you don't come out with any kind of answer.
25 You come out with road maps, you come out with

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1 possibilities, and you come out with what's the
2 consequence if you act in certain ways on the basis of
3 what we know about a technology.

4 I think that the other point that I would make
5 is that if you do it fairly, technology assessment
6 generally makes everybody a little bit angry and
7 everybody a little bit happy. I think I really
8 thickened my skin working at OTA, but inevitably,
9 whatever we published got heavy criticism and a lot of
10 praise at the same time, and they often came from the
11 same people, and I think that that's an important thing
12 to remember, whatever side of the debate that you're
13 sitting on, is that whatever you come out with at the
14 end of this process, we'll all have learned a lot more,
15 but we may not all be happy with all of the outcomes of
16 what we find.

17 The second point that I wanted to talk about,
18 since time is limited, is best practices. I'm really
19 excited to hear about all of the work that's going on
20 creating guidelines, creating some of these high-level
21 principles, and I think what's really important going
22 forward is to build on that effort and to start to bring
23 those 30,000-foot efforts down closer to where the
24 technology is being used and down to more practical
25 applications.

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1 I'll just point out one example. We've talked a
2 lot about how it's really, really important that
3 consumers get good notice about what this technology is,
4 how it works, what its benefits are and how they can
5 control the information collection around RFID, and
6 we've talked about consumer education, and I would say
7 that we've had enough experience at this point in the
8 area of providing notice to consumers that we know that
9 in different kinds of environments with different kinds
10 of technologies, this exercise can be really, really
11 challenging, and I think that this is a place where
12 we're going to have to do some very creative thinking
13 about how you provide notice to consumers about an
14 invisible technology that provides very passive kinds of
15 data collection, and conveying to consumers in a
16 meaningful and effective way what's happening is going
17 to be a big challenge, and I think you could take that
18 similar analysis when you start talking about things
19 like providing choice and providing accountability.

20 To make thiylit50et that

3 consumers get good notice about what this techubout an ati d

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1 work on it quickly, we can come up with at least a first
2 iteration of something that will work, that we can take
3 to the marketplace and implement quickly, and as
4 Elizabeth said, continue to refine, continue to think
5 about this, and continue to figure out what's going to
6 be best for us moving forward.

7 To arrive at these best practices really
8 requires a concerted effort of all stakeholders and
9 interested parties, but I think that if we do the hard
10 work now, we can come up with something that is going to
11 serve both consumers and businesses and I think
12 importantly is going to inform further decision-making
13 about policies about privacy around RFID for the future.

14 Thank you.

15 MS. THORLEIFSON: Thank you, Paula.

16 Our next panelist is Rob Atkinson. Mr. Atkinson
17 is Vice President of the Progressive Policy Institute
18 and Director of PPI's Technology and New Economy Project
19 and the author of many other things, but he's here to
20 talk to us about meeting the challenge in best
21 practices.

22 MR. ATKINSON: Okay, thank you. I want to thank
23 the FTC for holding this panel, because I think it's an
24 important issue.

25 I have to admit right away, just so you know

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1 where I'm coming from, I am an RFID advocate and user.
2 I have my smart card, so if anybody wants to know where
3 I went on the Metro recently, just log into their
4 database. I have my key card, if you want to break into
5 PPI, just scan that. I also have my Mobil SpeedPass to
6 tell you where I've been recently. And not only that,
7 but I have not one but two grocery store loyalty cards,

1 a tag when they would make it dormant and later
2 reactivate." So, obviously we shouldn't even pursue
3 kill tags, because storeTDD3Di

1 customers so they can get them to come back.

2 The last one is one that Jim Waldo mentioned
3 about the RFID rifle on the Web site. You can laugh at
4 that, but John Gilmore, who's a board member of EFF,
5 Electronic Freedom Foundation, he scoffed at the rifle
6 idea, but he did say this, he said, "People with RFID
7 chips in their clothing, books, bags or bodies could be
8 targeted by smart projectiles that will zero in on that
9 particular tag." This is something we will probably use
10 to get Osama Bin-Laden, we will get him to wear some
11 Benneton clothing.

12 He also goes on to state, "Imagine being able to
13 bury an explosive in a roadway that would only go off
14 when a particular car drove over it. You could bury
15 these bombs months in advance on any major or minor
16 roadway. You could change the targeting whenever you'd
17 like. You can give a whole list of cars that would
18 explode." I think it would be a little hard to dig up
19 Interstate 95 and put an RFID tag, reader in there, and
20 pour the concrete that night, get it all nice and smooth
21 before the next day, but you know, who knows?

22 So, in other words, look, what this debate is
23 really about is let's scare the American public, let's
24 scare regulators, let's scare legislators, because this
25 is an awful technology. The reality is, most of that's

1 technologically impossible, most of it's practically

1 Third, I think most Americans really don't care
2 about this. I think they see there's no real problem.
3 There are no real harms with bar codes. There are no
4 real harms with credit cards. They use the stuff, and
5 they use it for a pretty simple reason, because it
6 provides them with real benefits in their daily lives.

7 But that's not good enough, so what privacy
8 advocates want to do is basically make the millions of
9 Americans who are happy with this technology to pay
10 extra money, because if we delay RFID or if we add costs
11 by making the chips so complex to serve all these
12 privacy functions, the cost is going to go up and we are
13 going to significantly reduce the benefits.

14 Finally, I think in terms of what should public
15 policy do, I think right now, public policy should
16 certainly not consider legislation. I think the main
17 thing we need to be looking at is is the industry likely
18 to proceed along the lines of providing notice, choice

1 productivity and make our lives better, so that we can
2 all understand it. The second thing is to work closely
3 with groups like EPCglobal, to make sure that they are
4 doing things like making sure that there are privacy
5 notices and that there is no surreptitious tracking. I
6 completely agree with people that say that surreptitious
7 tracking is bad. If you are going to have a reader, it
8 ought to be out in the open.

9 If it turns out that surreptitious and rogue
10 tracking is possible, which is a highly debatable point,
11 we can pass laws against that, just like we've passed
12 laws against using cell phone cameras in bathrooms. Did
13 we outlaw cell phone cameras? No, absolutely not.

14 So, in closing, I would just close by saying I
15 think it's way too early to even consider any type of
16 legislation. This is a technology that's going to have
17 significant benefits for Americans, and we ought to just
18 let it evolve.

19 Thank you.

20 MS. THORLEIFSON: Thank you.

21 Our final panelist, who is going to address some
22 of the ways that the technology is evolving, is Dr. Ari
23 Juels, who is a principal research scientist at RSA
24 Laboratories, where he oversees the various data
25 security projects of the Applied Research Program. Go

1 ahead.

2 DR. JUELS: Okay, thank you, Tracy.

3 It's probably fitting that I'm the last speaker
4 of the day, because I would like to contradict most of
5 what was said over the course of the day now.

6 There has been a polarization among panelists
7 into two camps, into the privacy advocates who view live
8 RFID tags as an absolutely pernicious state of affairs
9 if placed in the hands of consumers, and then industry
10 advocates who pooh-pooh the privacy concerns that the
11 advocates have brought forth.

12 One question that was posed by the audience to
13 the previous panelists was whether it was possible to
14 have live tags in the hands of consumers and to achieve
15 privacy at the same time. In other words, can we strike
16 a balance between privacy and utility? And I'd like to
17 suggest that the answer is quite possibly yes and would
18 like to give you a glimpse of a technical vision for how
19 to achieve this. I think that we need some
20 complementary legislation, but as a technologist, I am
21 going to talk about this primarily from the technology
22 side and talk about a possible way of achieving this
23 balance.

24 As a computer scientist and a data security
25 specialist in particular, I view RFID in the following

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1 terms: RFID means that we will have a world with
2 billions of ant-sized computers, tiny computers. This
3 is, in effect, a new type of computing infrastructure.
4 We already have a great deal of difficulty securing the
5 existing computing infrastructure, so we have to pose
6 the question naturally: what are the implications for
7 privacy and security when we introduce all of these new
8 little computers into the world?

9 This is complicated by the fact that these are
10 highly constrained devices from the computational point
11 of view. They carry very little functionality, and in
12 particular, they're unable to perform many of the data
13 security functions that we're accustomed to employing in
14 securing existing computer networks and computing
15 devices. For instance, they can't perform encryption,
16 and in fact, even if they could, encryption wouldn't
17 solve most of our problems, as I'll discuss in the next
18 slide.

19 As we've discussed over the course of the day,
20 they are subject to clandestine scanning and mobile and
21 personal. These are particular complications here, and
22 computer security is already fairly hard in general.

23 On the other hand, we've already managed to
24 secure a world with a broad array of computing devices,
25 everything from mainframes to PDAs, and what we've seen

1 is that with good tools and foresight, we can at least
2 achieve adequate computer security, and I think that we
3 can achieve adequate security and privacy with respect
4 to RFID.

5 A key thing to observe here is that in places
6 where we didn't plan well in advance, we're paying the
7 price now with regard to viruses, for instance, and
8 general hacking attacks, denial of service, trojan
9 horses. We didn't think in advance about these security
10 problems, and they've become extremely problematic and
11 costly now. So, it's incumbent upon technologists to
12 try to address future concerns even before the
13 technology really gets off the ground.

14 Let's cast our minds forward to, say, the year
15 2015 or whenever it may be when individual RFID items
16 are, in fact, tagged, and there's been a great deal of
17 skepticism regarding the ability to scan tags when
18 carried by a consumer, because of problems with UHF
19 tags, for instance, encountering interference from
20 liquids, human beings being liquids, and so on and so
21 forth, but we're essentially arguing about video
22 surveillance in the age of the daguerrotype. We don't
23 know exactly how this technology is going to evolve, and
24 there will undoubtedly be advances that will make
25 scanning more effective. So, let's think about the

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1 there will be hundreds.

2 There's also been the suggestion made that we
3 can simply encrypt these numbers in order to protect
4 them, but encryption is a red herring here. If you
5 encrypt the number 1-2-3, you will get another number,
6 perhaps it will be 8-9-7. It won't take people too long
7 to figure out that 8-9-7 means Coca-Cola. So,
8 encryption doesn't quite solve the problems.

9 There's also the suggestion that all of the data
10 being scanned from RFID tags will be contained in
11 databases and protected from a legal standpoint by a
12 privacy policy, but even if the manufacturer of the

1 think a particularly telling statistic, due to Ravi
2 Pappu at Thing Magic, is that some 42 percent of the
3 Google hits on RFID include the word "privacy."

4 One solution that's been proposed over the
5 course of the day is killing of RFID tags, and this
6 appears to make sense. If you kill the tags, of course,
7 dead tags tell no tales, but this also I think is rather
8 a red herring, because RFID tags are much too useful,
9 and I'll explain why I think that is.

10 There's been the implication that consumer
11 choice is going to be the most important tool to bring
12 to bear to defend consumer privacy, but if you give
13 consumers a choice between convenience or lack
14 thereof -- and having RFID tags will be convenient -- of
15 course, they'll choose the convenient option.

16 Moreover, suppose that consumers do choose to

1 scanned and successfully returned to him, and he didn't
2 want the cat back, but he kept getting it back.

3 Okay, we have had many different descriptions of
4 many of the wonderful applications that RFID will bring
5 to consumers. It's a fantastic technology with many
6 benefits that have to be preserved. I won't go over any
7 of these in depth, because we have already learned quite
8 a bit about them.

9 Okay, so, the key message here, and again, I am
10 going to talk about a particular technology, is that
11 embedding of RFID tags, if done naively, may well pose a
12 serious threat to consumer privacy. It's hard to
13 predict the exact degree and nature of that threat, but
14 it will undoubtedly be present, but we can mitigate this
15 problem with the right technology and the right
16 forethought. Let me give you a glimpse of how this
17 might work, for instance.

1 reader tries to scan tags it shouldn't scan, if it tries
2 to scan private tags, the blocker tag will effectively
3 spam the reader. It does this by tricking the reader
4 into thinking that every possible tag in the universe is
5 present, so the reader sees a possible collection of
6 items, several thousand pairs of sneakers and a bunch of
7 dish washers, so on and so forth, and it has to give up
8 scanning. That's how this works.

9 Of course, this would be a disaster if somebody
10 brought it into a supermarket and the blocker works in a
11 naive way, it would cause the supermarket to shut down,
12 but the blocker can be selective, and in particular, the
13 blocker can protect privacy of private items, which is
14 to say items that have been purchased, without
15 interfering with the normal scanning operation in the
16 supermarket.

17 So, this gentleman can purchase his two bottles
18 of merlot, the bottles can be scanned before he's
19 purchased them, but will no longer be subject to
20 scanning after he's paid for them and the bottles belong

1 will work with a privacy bit embedded in RFID tags, and
2 to be more concrete, in a supermarket environment, all
3 of the tags on items on the shelf would have their
4 privacy bit flipped off. When a consumer purchases an
5 item, the bit would be flipped on, and again, the
6 blocker would only block those items with a privacy bit
7 on until the consumer decides that he or she wants to
8 make use of the tags.

9 These are essentially, these blocker tags
10 themselves, RFID tags. They can be very inexpensive.
11 They can be embedded in shopping bags, in loyalty cards,
12 so on and so forth. Standard integration is extremely
13 helpful here, and we hope that EPCglobal will support
14 this proposal, and in fact, there may well be a good
15 chance of that.

16 I should also say in response to critiques by
17 the privacy advocacy community that we've developed ways
18 of allowing the blocker to enable both opt-in and
19 opt-out approaches, so that there need not be a burden
20 on the consumer necessarily to carry a blocker tag if he
21 or she wants to achieve privacy.

22 We had a blocker prototype demo here today,
23 which I hope some of you had a chance to see, and I
24 should say there are many other technical approaches to
25 the privacy problem. There are also legislative

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1 approaches, although I would agree that legislation is
2 premature at this point.

3 If you want to learn more about this, here's an
4 unofficial URL for the RSA Labs Web site. Thank you.

5 MS. THORLEIFSON: Thank you. Now we have some
6 questions. First, Elliot.

7 MR. MAXWELL: Let me address this to Marks &
8 Spencer, to the king of RFID. The question is -- two
9 questions came in. Many of Marks & Spencer's policy
10 decisions appear to be driven by UK privacy law. In the
11 absence of similar laws in the U.S., why should
12 Americans expect similar transparency in item-level
13 tagging in the U.S.?

14 Another sort of related question was, what, if
15 any, role did the EU privacy regulatory regime play in
16 the arrangements that you have made with respect to
17 RFID?

18 MR. STAFFORD: Okay, it's not really true to say
19 that our policies are driven by UK privacy law, though,
20 of course, we want to stay within the law. We would
21 like to go a lot further than legislation in terms of
22 what we're doing. The UK European privacy law refers to
23 customer information. We're not about the customer.
24 We're not actually collecting any information about the
25 customer at all. So, we're kind of outside that part of

1 the law anyway.

2 But our policies are driven by talking to our
3 own staff, by talking to consumers and talking to
4 consumer groups, and I think that certainly within
5 Europe, after the issues on genetically modified foods,
6 after the issues on BSE, who does the consumer look to
7 in Europe for good advice in terms of complex
8 technologies? And I think that privacy groups and
9 consumer groups have a role to play in taking some of
10 these complex issues and making them simple and
11 highlighting what parity is required.

12 So, I think that what I'm saying really in
13 answer to the question is no, it's not just about the
14 law. It's going beyond the law, and legislation, of
15 course, is behind the real issues, I suspect.

16 MR. MAXWELL: Just as a follow-up question, I
17 assume that Marks & Spencer has a customer loyalty
18 program of some sort, and how do they deal with
19 questions of personally identifiable information in that
20 program?

21 MR. STAFFORD: We have a new -- we do have a new
22 customer loyalty program that's quite new. It works at
23 till points in our stores. I mean, we have a very, very
24 strict policy of never selling any data that we have on
25 our customers to anybody else. So, anything that M&S

1 happens to know about you stays within Marks & Spencer.

2 MR. MAXWELL: A question was raised for Paula.
3 I trust that my retailers have little incentive to
4 surveil me outside of the retail setting, so doesn't
5 this alleviate the threat of RFID to privacy?

6 MS. BRUENING: Could you say the end of that
7 question?

8 MR. MAXWELL: I trust that my retailers have
9 little incentive to surveil me outside of the retail
10 setting. Does this alleviate the threat of RFID to
11 privacy?

12 MS. BRUENING: Outside of the -- they have
13 little incentive outside of the -- well, I think that
14 one of the concerns that keeps coming home to me when I
15 hear these discussions is the way that RFID tags are
16 potentially going to be used with loyalty cards or
17 simply used along with credit card information to
18 compile this kind of personally identifiable
19 information. It's a similar kind of collection that's
20 happening in a different way, and it's happening with a
21 technology that I can't see, and I think that that, in
22 itself, is a first line of concern.

23 I don't think it's just about what happens when
24 you leave the store. I think it's about the practices
25 that go on around the technology within the store. So,

1 I think to say that -- you know, walking out the door of
2 the store I don't think makes the problem run away.

3 MR. MAXWELL: Rob, the question says, you say
4 that Wal-Mart wouldn't see Mobil's data from the
5 SpeedPass, but won't the EPC system allow exactly that?
6 Aren't both firms going to be using the EPC system?

7 MR. ATKINSON: It's not my impression that they
8 would -- there may be particular codes that are in the
9 EPC database, but why they would have access to the
10 actual database from another company to look at exactly
11 what has been bought, where, when, who, I just don't see
12 that happening.

13 MS. BOARD: All you get from the EPC object
14 naming service, or ONS, it gives you direction on where
15 the server is that holds this information. The
16 information is held at the individual company. And I
17 want to say specifically that it's in these companies'
18 best interests to have incredibly secure data networks,
19 because they don't want their competitors to get any
20 information about their business. So, there is the
21 highest level of security for this information.

22 MR. MAXWELL: There's a comment that was passed
23 in as well from a spokesman from Procter & Gamble, and
24 it says, in response to Ms. Albrecht's comments, we
25 would like to set the record straight. Procter &

1 Gamble's Pantene bottle was tested in a laboratory
2 environment only and never reached a retail environment.
3 Procter & Gamble has always supported consumer choice to
4 keep the tag active or to kill it.

5 Let me sort of follow up on a point that was
6 raised by Ari and Rob and also from Cedric in this. The
7 issue of choice on the part of consumers is sort of
8 central to many of the questions about privacy. How
9 should we think about choice if, in fact, consumers say
10 I'm perfectly happy to have this kind of information
11 aligned together and I trust this retailer? Does that
12 make the privacy issues go away with respect to that
13 consumer, or should there be rules that go beyond that
14 if the consumer is willing to make such a choice?

15 Ari commented about that in terms of consumer
16 choice, but Cedric, the rules that you propose and the
17 like, and Rob, the comments that you made suggest that
18 we should at least be thinking about how much do we
19 weigh the choice that an individual consumer makes about
20 the information that's collected or potentially
21 collected about him or her.

22 MR. LAURANT: Yes, consent is very important to
23 consumers. They must know -- for their consent to be
24 taken as consent, they must be totally aware of what's
25 going on with the tagging, with what kind of information

1 is being collected, processed later on, desimulated,
2 collated with other preexisting customer information.

3 What I can see now happening by reading the tags
4 that Marks & Spencer and Tesco and other companies
5 display to customers is that the statements are somehow
6 misleading. They do not explain clearly what's going
7 on. They do not explain clearly that the information
8 the customer will provide to the retailer, how that
9 information will be disseminated to other companies,
10 will be disclosed to other companies later on or might
11 be later on disclosed.

12 This is a very important part of most RFID
13 privacy policies that is generally not included in those
14 policies, is the fact that consumers should, if there is
15 an abuse, that their data is being disseminated contrary
16 to what the policy privacy establishes, they should have
17 access to court to have fair compensation, and that does
18 not exist under the current law, and I think the FTC

1 has, in fact, sued companies who have posted privacy
2 policies and then not followed them.

3 MR. LAURANT: Yes, I haven't said that, but they
4 have the discretion to do so, and there is no
5 possibility when customers' privacy is being invaded to
6 actually sue the company, the infringing companies,
7 before a court.

8 MR. ATKINSON: I guess my take on that, Elliot,
9 is that a lot of the choice discussion ends up being
10 framed as if choice is costless, and if you thought
11 about choice from the environment -- let's say
12 ultimately we get to the Metro smart card solution where
13 you can stick your card through and it automatically
14 gets scanned, which I'd love to have, boy, that would be
15 great, you could really cut the cost of products and
16 speed checkout.

17 What if somebody says I don't like that, and I
18 deserve choice, so I deserve to actually have my stuff
19 read individually by somebody who's looking at it and
20 looking at the price. Okay, that's going to raise the
21 cost of checkout a significant amount, probably add a
22 dollar to checkout. Is the company going to be able to
23 charge for that? No way. Companies simply will not
24 charge for that, because it's the way the market works,
25 and yet, who will pay for that? Pretty much everybody

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1 else who doesn't really care.

2 So, I think we've got to really be careful with
3 choice. We have got to say, what are we actually giving
4 people choice of? And I think the choice should be, to
5 the extent feasible, do you remove the tag or not?

6 But the sort of choice about databases I think
7 is frankly a red herring. It's a problem in search of a
8 solution. We don't have choice today when I go to
9 Safeway and I use my credit card. If I don't want them
10 to know who I am, I just pay with cash. That's the
11 choice we make. You don't like it, pay with cash.

12 MR. MAXWELL: In the post-9/11 environment, one
13 of the observations that people have made is that
14 information in the hands of the private sector is no
15 longer so clearly distinguishable as information in the
16 public sector. The use of private sector information
17 for anti-terrorist activities and the like has tended to
18 collapse a distinction that we used to make very clearly
19 between information that private companies had and
20 information that the Government had access to, and I'm
21 wondering whether this kind of collapse of the
22 distinction would change any of the things we do about
23 information collection in general.

24 It's not specific to RFID, but it may change how
25 we think about the rules governing access to

1 information. I'd be interested to see whether anyone
2 wanted to comment about that.

3 DR. JUELS: Well, I think that you're pointing
4 to a larger phenomenon here, Elliot, which is the fact
5 that the abuses of RFID may not necessarily be committed
6 by the original owners of the RFID tag. The retailer
7 who sells me the given item is not necessarily going to
8 be the malefactor who abuses my privacy, and there
9 should be concerns about abuse of RFID by local law
10 enforcement, for instance, particularly the abuses that
11 can take place covertly, and by retailers who may not
12 have privacy policies in place, to reiterate an earlier
13 point.

14 RFID is different than a loyalty card or a
15 credit card in that it's not a closed system. The RFID
16 tag can be scanned by somebody other than its original
17 owner, and it can be scanned at times when there's no
18 active volition on the part of the consumer.

19 MR. MAXWELL: But at the same time, I'm
20 concerned that legislation, precisely because RFID, its
21 technological facets make it such a slippery beast, that
22 legislation may not be effective in capturing all of
23 these nuances and really protecting consumer privacy.

24 Okay, I think this is going to be the last
25 question, and I would suggest a kind of theme that's

1 gone throughout this, trying to figure out how RFID is
2 different if in any significant way from what
3 information consumers provide and retailers have had
4 access to in the past. Merchants have known the names,
5 addresses, items purchased, frequency of shopping,
6 amounts paid and lots of other stuff about their
7 customers since the 1800s and before. So, really, what
8 is new now, and what should we do differently now than
9 we do with respect to the information that they have had
10 access to and have had access to for quite some time?

11 MR. ATKINSON: Nothing.

12 MS. BRUENING: I'll take the other side of that.
13 Well, I think it's the power of the databases and it's
14 the computing power that allows the information to be
15 shared and collated and mined so efficiently, and I
16 think that's a lot of where -- your point about the
17 porosity of a wall between public and private sector
18 becomes so important, that because of that power and
19 those rich dossiers that we can potentially create, our
20 concerns about who has access to that become greater,
21 especially in the environment we're living in.

22 MR. STAFFORD: I think I would just sort of like
23 to bring it a little bit back to in the end, the RFID
24 deployment by retailers and manufacturers will be driven
25 by very sensible and very robust business cases to make

1 the investment and to see a proper return on that
2 investment. It's very hard to think of any scenario
3 involving customer information that actually justifies
4 any of this sort of investment.

5 There is such an enormous opportunity to use
6 RFID to improve the efficiency and visibility of supply
7 chains and to actually provide better customer service,
8 but I don't think anybody really needs to go into these
9 contentious areas, because I don't see the business case
10 for it.

11 Now, of course, we should be aware about what
12 other people could do with what we're using by accident
13 or by design, but provided we keep thinking about the
14 possibilities going forward and we keep trying to steer
15 away from any negatives, then I think we've got a rosy
16 scenario for it. But be clear, there isn't a business
17 case about gathering customer information through RFID.
18 The business case, the fantastic business case, is all
19 about manufacturing efficiency and supply chain
20 efficiency, and that's the direction the industry will
21 take RFID in, I believe.

22 MR. MAXWELL: Let me then sort of make one sort
23 of comment before we wrap up. There clearly are a
24 couple of distinguishable issues. As people described
25 throughout the day, there's relatively little concern in

1 the supply chain, per se, about the privacy issues.

1 amount of information you've been given, and if anyone
2 would like to know what my purchases are at Giant and
3 Safeway, they can come up and see me after.

4 Thanks very much.

5 (Applause.)

6 MR. HARWOOD: I just want to mention as people
7 are headed out that you still have an opportunity to
8 comment on anything that's been said today or submit
9 additional comments. Comments are open until July 9th
10 on the FTC's Web site, which is ftc.gov/rfidworkshop.
11 We would love to hear from you if you have more thoughts
12 about what we've talked about today.

13 I would like to thank everybody who's come today
14 on behalf of Director Beales of the Federal Trade
15 Commission, particularly thank our panelists and
16 particularly thank Julie Brof for putting this on.
17 Thank you very much.

18 (Applause.)

19 (Whereupon, at 5:32 p.m., the workshop was
20 concluded.)

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1 C E R T I F I C A T I O N O F R E P O R T E R

2 DOCKET/FILE NUMBER: P049106

3 CASE TITLE: RADIO FREQUENCY IDENTIFICATION WORKSHOP

4 DATE: JUNE 21, 2004

5

6 I HEREBY CERTIFY that the transcript contained

7 herein is a full and accurate transcript of the notes