The Committee met in the Admiral II and III Rooms of the Courtyard Marriott Capitol Hill/Navy Yard Hotel at 140 L Street, Southeast, Washington, D.C., Bob Denaro, Chairman, presiding.

PRESENT

BOB DENARO, Chairman
STEVE ALBERT
SCOTT BELCHER
ROGER BERG
JOSEPH A. CALABRESE
JOHN CAPP
PAULA HAMMOND, P.E.
STEVE KENNER
RONALD F. KIRBY
J. PETER KISSINGER
DR. HANS KLEIN
SCOTT J. McCORMICK
DR. RAJ RAJKUMAR
BRYAN W. SCHROMSKY
ANTON STEENMAN
GEORGE T. WEBB, P.E.

ALSO PRESENT

STEPHEN GLASSCOCK, Designated Federal Official
NATHANIEL BEUSE
VALERIE BRIGGS
WALT FEHR
CHARLES GLASS
TIM JOHNSON
TIM KLEIN
BOB KREEB
KEN LEONARD
MIKE LUKUC
DAN SMITH
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CALL TO ORDER

MR. GLASSCOCK: As the Designated Federal Official (DFO), I am calling the meeting to order.

Welcome to everybody. Good to see you again.

This ITS Program Advisory Committee meeting is open to the public, and everything is recorded. It would help if you would please identify yourself when you are speaking.

The meeting is governed by Federal Advisory Committee Act (FACA) rules.

If you have any questions, let me know.

At this time, I will hand it off to Greg Winfree, the Deputy Administrator of RITA.

Thank you.

WELCOME REMARKS: GREG WINFREE

MR. WINFREE: Great.

Well, good morning, everyone. Thank you so much for coming back to the Nation's capital for this important assemblage. I hope you appreciate the convenience that this wonderful hotel provides for us here in the Navy Yard. It is a great addition to the community.

I know we have a lot to talk about, a lot to cover. We are in some pivotal times with respect to intelligent transportation systems. So, your valued commentary and advice is very much appreciated and sought out at this juncture.
And just to talk about kind of the international applications of ITS, we had a delegation visit with us yesterday from Mexico, and it involved their Secretary of Transportation as well as their Ambassador and a whole cast of senior leaders in the transportation and commerce and transport space.

They are very much interested in applying ITS technologies in their country. What we encouraged them to do was to look at the national architecture that we have and that we share with Canada. So, this could very well be an NAFTA-wide enterprise as well. But more to come on that, and your advice will be sought in that regard as well. But I just wanted folks to hear kind of the latest from the Department.

And without further ado, I will turn it over to Bob Denaro.

WELCOME REMARKS: KEN LEONARD

CHAIR DENARO: Thanks, Greg. Thanks for coming this morning.

Well, first of all, let's introduce Ken, who is Ken Leonard, our new Director of JPO. So, fresh here. What, about five months now or so since--

MR. LEONARD: Yes, about four.

CHAIR DENARO: Four months?

MR. LEONARD: Yes, four or five months.

CHAIR DENARO: Oh, you're an expert already.

(Laughter.)

MR. LEONARD: Well, I know how to spell I-T-S. That is one of the things they taught me.

(Laughter.)
And I have learned it is not the "ITS" program, which is another milestone.

(Laughter.)

But, no, I just want to say I am delighted to be here. I am really enjoying working and being the Director of the ITS Joint Program Office.

My background in transportation came from the Federal Motor Carrier Safety Administration and, before that, I spent a lot of time at the FAA working on NextGen, working with their Joint Program Office.

I have been involved with R&D for a very long time. I had some opportunities to work with federal advisory committees before over at the FAA and attend some of the NASA advisory committee meetings. So, what I can say is I am grateful, extremely grateful, to have such a qualified Advisory Committee to assist the Joint Program Office in its important work.

I am really looking forward to hearing from all of you and getting your advice on some very important topics. We have a very full agenda.

So, with that, I am going to turn it over to Bob to get into that agenda.

CHAIR DENARO: All right. Thanks, Ken.

MR. WINFREE: Bob, can I step in?

INTRODUCTIONS: TIM JOHNSON, NAT BEUSE, DAN SMITH

CHAIR DENARO: Yes, please.

MR. WINFREE: I need to apologize. I was completely remiss in not introducing Ken, even though he prompted me five minutes ago that this was his first meeting.

(Laughter.)

We have been working so closely, I just assumed that he had met everyone. But we had
him making the rounds with AASHTO and AFTA and other organizations to make sure that he has
been properly introduced.

And also, I would like to introduce two of our senior executives at DOT who are in key
positions. So, I will let them introduce themselves, Tim Johnson and Nat Beuse, and have them
just give you a brief summary of why they are involved with ITS.

Tim?

MR. JOHNSON: Good morning, everyone.

Tim Johnson. I am the Director of Crash Avoidance and Electronic Controls Research at
NHTSA.

And so, we are the office that is carrying out all the multi-track program on V2V research.

You may have seen folks that work for me in the past appear before the Committee. But I am glad
to be here, and we are bringing everything home, hopefully, in 2013 and synthesizing all our
information together to make these decisions. I am glad to be here.

MR. BEUSE: And my name is Nat Beuse. I am the Associate Administrator for
Rulemaking at NHTSA -- for RITA. I'm sorry. I came from the Rulemaking.

(Laughter.)

So, I took over this position that was once held by Don Maddick, whom I am sure some of
you know.

As I miscorrectly stated, I spent a lot of time in the Rulemaking Office and on the crash
avoidance side of things. We are also running the New Car Assessment Program. We have got a
New Car Star Rating Program. And then, for the last five years, I have been running Crash
Avoidance Rulemaking at NHTSA in charge of all rulemaking, actually, in that office.
And so, I have a chance to be on the research side of things. I am looking, very glad to be interacting on the ITS side of things because I find it very exciting and very interesting.

As Tim mentioned, we have this big decision coming up in 2013. Certainly, some of this stuff that comes out of the 2013 decision and stuff that is on the ITS roadmap are all kind of intertwined. And so, I look forward to working with you guys on that.

And to also introduce our boss, who is Dan Smith.

Dan?

MR. SMITH: I was just leaving. Thank you.

(Laughter.)

Good morning.

MR. WINFREE: Dan, could you just briefly remind folks of your esteemed role with NHTSA?

MR. SMITH: My esteemed role?

(Laughter.)

I am Dan Smith. I am the Senior Associate Administrator for Vehicle Safety at NHTSA.

OPENING REMARKS: CHAIRMAN BOB DENARO

CHAIR DENARO: Good. Well, thanks to our guests. I think you will add a lot today.

So, thank you all for coming.

I just want to give a little overview. First, let me say the room is convenient and everything, but, for some reason, when I walked in this morning, I had this image of we kind of had a view that we wanted to have our meetings on a cruise ship.

(Laughter.)
In the past, we have had them on a tug boat. And today, we are in a canoe.

(Laughter.)

We will deal with it. As Dan found out, the best route to this end of the table is out through the hall somewhere.

(Laughter.)

So, if you would just give me the next chart up there?

I just wanted to point out we do have a package in there. Just to get everyone grounded where we are going, first of all, we agreed in our last couple of meetings that we really want to focus on the upcoming NHTSA-proposed rulemaking and consider a memo on our position on that. That is something we really want to get pretty far on today in terms of what we would like to say there.

The second is to review the current status of the 5.9-gigahertz sharing proposals that are out there right now. This is an item that came up reasonably recent for us, but we agreed again at the last meeting that it is kind of an elephant in the room, and we really should address this and, as a Committee, consider weighing-in. So, I think that is another major focus of this meeting, and we have got some presentations on that subject.

The third is that our new JPO Director, Ken, has some requests for advice. This is cool. We are getting asked directly for some advice on some topics that he needs to respond to. This is new for all of us. You haven't heard this before. We are going to hear it today, and we will discuss it a little bit, make sure we understand it. But this is some additional things for us to look at today.

And then, the original purpose of this meeting, if we go back to the beginning, we always
said we are focusing on the end-of-year memo that we are going to write and the recommendations.

What we would like to do today, especially tomorrow with the breakout meetings, is make progress toward that final list of issues that we are going to deal with, what the Subcommittees are coming up with, and then, as a whole Committee, what we all agree are going to be the issues and the general nature of the recommendations we are going to make. And that, again, an end-of-year memo with that.

So, if you go to the next chart, some of this is we have got a lot of deliverables here for our tiny, little Committee.

We have completed the advice memorandum from last year. A couple of months ago, we put that out. We now have to consider this interim advice memorandum, what we thought we agree that we wanted to do, the NHTSA proposed rulemaking, an Interim Memorandum now on the 5.-gigahertz spectrum sharing, and the timing for that is very good. Response to Ken's advice request, and how can we take that on, what to do. And, as I said, our final memorandum. So, we have got a lot to do in the remaining months of the year that we have.

As a Committee, we will have to figure out what we are going to do, agree to what we are going to do, and how we are going to get that done.

So, I just want, as we go through the agenda here, to keep everyone focused on what the end-products are here.

Any questions on any of that?

(No response.)

All right. Great.

Do we have coffee outside? Yes.
Let me have you go first, but, then, we will have a few minutes. I am going to declare a mini-break, so everyone can go out there and get some coffee and come back in. And then, we will start with the 8:30 session.

But, before that, Hans.

OPENING REMARKS: VICE CHAIRMAN HANS KLEIN

VICE CHAIR KLEIN: Okay. Well, I mean, just to summarize what we are doing here, maybe my comments will be a little parochial and a little bit of repeat of what I have said before.

I think implementation and deployment are implicit in a lot of what is up there. As this program moves from R&D towards getting things out in the field, we are going to find that these implementation issues permeate all aspects of our work here.

So, taking excellent ideas, be they in standards, be they in security, be they in the development of entire systems, and getting them out there into the field in interesting ways, and the challenges that that presents because the people in the field are, obviously, when they are at the federal level, there is a jump to state and local. When you are in the public sector, there is often a jump to the private. When you are in the transportation sector, there is often a jump to the automaker sector, to the networking sector, to the data service delivery sector.

So, I think in all aspects of what we are doing here you have to keep in mind that we are transitioning towards deployment, and that can be a common theme across all our work. And it will be, obviously, a particular focus on one of the Subcommittees that focuses on the markets.

So, I just urge us all to keep that in mind in this meeting, and I know that that will steadily rise in importance in the program on the national.

CHAIR DENARO: Thanks for focusing on that, Hans.
All right. So, let's take a mini-break, just five minutes, if we can, to get some coffee outside.

All right. We will reconvene in five or seven minutes.

(Whereupon, the foregoing matter went off the record at 8:19 a.m. and went back on the record at 8:26 a.m.)

PRESENTATION: NHTSA 2013 DECISION

CHAIR DENARO: All right. So, this session that we are entering right now is about the decision or proposed decision on rulemaking. We have got a little bit more than an hour and a half.

I think for all these sessions, again, given the number of topics we have, I think it will be smart to adopt a policy of let's have all the interaction and everything else. If there are issues that are going to run longer, or whatever, let's table those, put them in the parking lot, and take them on later, so that we stay on schedule.

But, again, thank you very much, Dan, for coming here and helping us through this discussion.

MR. SMITH: Well, thank you. Thank you for inviting us to your meeting.

As I said before, I am Dan Smith. I am the head of Vehicle Safety for the National Highway Traffic Safety Administration, or NHTSA.

And with me are our Associate Administrator for Vehicle Safety Research, Nat Beuse, who introduced himself, and Ken Johnson, who is the head of the Crash Avoidance and Electronics Office in the Office of Research.

So, I decided to come up to here. I don't have any PowerPoint. So, imagine a
PowerPoint.

(Laughter.)

But rather than turning this around, I thought I would come up with my computer.

Some of you, I can tell by the listing of who is here, some of you are only painfully aware of NHTSA. I am looking at our colleagues from the industry and our colleagues from RITA. Some of you probably don't know what NHTSA is or does at all. So, bear with me, those of you who are only too aware of us and let me just explain to the others what we do.

NHTSA has two major functions. One is behavioral safety, and one is vehicle safety.

The behavioral safety part of NHTSA you probably all know about. Any drunk driving or anti-drunk driving ad and seatbelt ads, and all those kinds of things, are co-produced and funded to some degree by our behavioral side of the house, who have been working on the seatbelt and drunk driving issues and, of late, working on distraction quite a bit.

And they also, some of you from the states probably know, have a fairly large grant program which helps subsidize the State Highway Safety Programs.

And the other side of the house, our side of the house, is vehicle safety. We have kind of the full gamut of the Vehicle Safety Program. We have Nat's Office of Vehicle Safety Research. We have our Office of Rulemaking, headed by Chris Bonanti. We are our Office of Enforcement, headed by Nancy Lewis. And we have the National Center for Statistics and Analysis, headed by Terry Shelton. That whole entity constitutes one program, although Terry's office, the Statistical Office, of course, serves the entire agency.

It is a luxury to have all of these parts of the Vehicle Safety Program under one roof, and we deal with other countries quite a bit. We go to China and deal with Chinese authorities. For
instance, they have four different ministries or agencies in Beijing to talk to the same people, our counterparts in our Vehicle Safety Office.

So, having all that under one roof is quite helpful in terms of having a coherent approach toward any vehicle safety issue. We like to be coherent.

So, that is just kind of the general organization. Our Administrator, David Strickland, some of you may know or some of you may have seen him either testifying or at various public events on behalf of seatbelt use, child safety, and hyperthermia prevention, and so on and so forth.

David is a great leader and manages to have mastery of kind of both sides of the house, having come from the Senate himself. He regrets having drafting some of the legislation that he did because now he is implementing it.

On all of the topics with which we deal, particularly if we are going to move towards standards, we start with kind of a pre-rulemaking phase in which we are really doing research to figure out what are the options. What is it we can actually accomplish? What are the technologies that might apply to a particular safety problem, as defined by, for instance, we will look at frontal crashes. We will look at what is causing frontal crashes, how many people are dying there.

We will look at the countermeasures that we have already put in place in terms of either crash-worthiness to preserve life in the case of a frontal crash or crash avoidance to prevent it in the first place. We will explore what might be useful or what might turn into a possible rule. And then, we will begin the rulemaking process.

The rulemaking process, how many of you have been engaged in the federal rulemaking process?
(Show of hands.)

Yes, our friends from Ford and GM reluctantly raised their hands.

(Laughter.)

But the rulemaking process, like the legislative process here on the Hill, is kind of designed to go slowly, kind of a checks-and-balances approach in which everything is designed to be a very deliberative process.

But the key to the American regulatory process is giving everybody an opportunity to comment on whatever it is you propose. And so, it is called a notice and comment procedure.

So that you put out a proposal, and then, expose it to the light of day, and then, address the comments that are provided. And, of course, if the rule is considered significant by the Office of Management and Budget, it gets reviewed by the White House as well.

So, rulemaking itself can take anywhere from one year if it lightning quick, which is almost unheard of, to more than four years or so if it is a very complicated matter. Really, it just kind of depends on whether it is considered significant and how the whole process unfolds in a particular subject matter.

Yes?

CHAIR DENARO: Dan, just a quick question. When you say one to four years, that is from your Notice of Proposed Rulemaking?

MR. SMITH: Well, yes. I mean, really, I am being very general here --

CHAIR DENARO: Right.

MR. SMITH: -- because every rulemaking is different.

CHAIR DENARO: Right.
MR. SMITH: And certainly, the research that might lead to a rule in itself might take
two, three, or four years, whatever, and then, the rulemaking process begins after the drafting, and
so on. But it is, again, a long and somewhat arduous process.

So, when you are leading up to that process, you want to do the best you can in your
research to figure out now what really are the possible advantages of doing a rule, what are the
possible pitfalls, and, you know, really, what are all the options.

And I would, although it is impolite for a guest to do so, if I had a blue pen, I would edit
the first couple of slides here which talked about our proposed rulemaking. We haven't actually
gotten to the point where we have decided to do a V2V proposed rule, and that is what our decision
this year is all about. I will explain more about it in a moment.

So, one of the major areas that we are dealing with, in which both Nat and Tim are
engaged, and certainly the whole automotive industry is engaged, are increasing levels of vehicle
automation, many of which have safety ramifications and some of which don't.

So, we kind of divide the automation world into various levels, and I won't bore you with
all those descriptions. But, basically, most of the vehicles that we drove until a few years ago were
at kind of level zero with no real automated safety features. You had to turn on the headlights
yourself. You had to steer yourself and accelerate when you wanted to and brake when you needed
to.

And we are gradually going into a situation where a lot of those vital safety functions are
increasingly automated, and all the way out to the kind of experimental vehicles that are at the full
self-driving capability, or at least aspire to be at full self-driving capability. Nobody is actually
there yet.
So, all of that is kind of coming down the pike at NHTSA and with NHTSA's involvement. The industry is both creative and cautious. The industry, you know, some of the smartest engineers in the world work for the industry and can figure out exactly how to apply these crash-avoidance technologies, but they also know that at greater and greater levels of sophistication and complication, there are also risks that need to be addressed before there is deployment.

So, all of that is going on wholly aside from vehicle-to-vehicle communications. And then, there is vehicle-to-vehicle communications. There, of course, the Department of Transportation and many of you have been involved for quite some time in figuring out what the possible capabilities are. We will talk a little bit about how the communications themselves from vehicle-to-vehicle can augment-supplement the onboard vehicle safety automation that is rapidly developing.

At some point, I think people might have thought it is either vehicle-to-vehicle communications to provide safety warnings or it is onboard automation and onboard warnings. But, as we proceed through all of this, we are rapidly concluding, I think, that what is going to develop over the next couple of decades will be a blending and fusion of communications technology, which, after all, provides certain information that no onboard sensors can provide and supplements some of the information it can provide.

So, dealing with that, that is kind of a long-winded explanation as to who NHTSA is and what we are doing. For the art of V2V, we are at the point where in our research and rulemaking and priority plan three years ago, we told the world that we intend to make a decision in 2013 as to how to proceed on vehicle-to-vehicle technology.

And again, just to underscore the decision we will make this year, we aren't planning
necessarily to propose a rule. We will not be proposing a rule this year. What we are going to
decide this year is whether to go to a rulemaking, whether to do additional research, or to do some
kind of combination of those.

Although we are enormously enthusiastic about vehicle-to-vehicle communications, and
generally think it is a vital, vital part of the future, we are trying to kind of suspend, not suspend our
enthusiasm, but we are trying to just take an even keel, as a regulatory agency, so that we let the
facts dictate what our decision will be.

And so, we kind of divide the issues into two general peaks, one being all the policy issues
that surround V2V implementation, and one being the technical issues, technological issues.

So, again, just to be clear, when we make a decision later this year, it won't necessarily be
the beginning of a rulemaking. It could be an announcement that we intend in 2014 to start a
rulemaking or we intend to do more extensive research on various aspects, or we intend to do both.

The partnership with our colleagues at RITA and Federal Highway has been vital.
Frankly, if left to its own devices, NHTSA would not be where it is now due to funding, and so
forth.

The ITS Program has been on this for such a long time and it is such an interagency
cooperative effort, and the industry as well, of course, has played an enormous role in that.

Various groups of manufacturers, and we have been working with one, the acronym for
which is CAMP, Crash Avoidance Metrics Partnership, isn't it? Yes, close enough?

And of course, VIIC, which is the consortium that deals with vehicle -- what is the

acronym for?

MEMBER WEBB: Vehicle Infrastructure Integration Coordination.
MR. SMITH: Thank you.

So, we, of course, learn from and work with those organizations to try to figure out exactly where we are headed with the technology.

Many of you probably know that the agencies did driver clinics in several cities last year in which hundreds of people, actually, and civilians off the street had the opportunity to experience the various safety applications. And more than 90 percent of them said they would love to have these applications in their vehicles. They were very enthusiastic about them.

Of course, now we are doing the model deployment in Ann Arbor, in which we have got nearly 3,000 vehicles out there actually communicating with each other. And we are collecting real data.

So, stop me. I tend to prattle on here. So, if there is any time you want to ask a question or interject your own, please do.

So, the NHTSA team, we decided, as we often do at NHTSA, that if we are considering a rule, it may be a rule that we are going to need an interdisciplinary kind of team. So, we organized such a team, actually, I think last year, I guess. And so, we pulled together folks from our Office of Research, our Office of Rulemaking, where, in fact Nat Beuse used to be the head of the Traffic Voidance Office there. And we pulled together our economists who grapple with the costs and benefits, our enforcers who would have to enforce something that would be producible, our Council who have to help draft and help justify a rule, and our colleagues from the JPO as well.

And we divided our labor into various subject areas, which I will get to in a second. But, basically, the charge of this group is not to write a rule. The charge of the group is to understand all the facts that are salient to a decision, to explain the current state of the art, whether it be policy
or technology, explain what issues remain open for resolution, and, essentially, to make
recommendations to senior management at NHTSA about whether we are ready to proceed to a rule
or where there may be some gaps.

The whole plan is for the team to finish its work perhaps late this summer, in time that its
work can go to senior management and, then, go through the entire deliberation and vetting process,
so that we can actually make sure that our political leadership in NHTSA, along with Greg Winfree
from RITA, and the political leaders in the Secretary's Office, are content with wherever we are
headed. So that, although we hope it is before midnight on the 31st, somewhere before the end of
the year we will be announcing our plan in terms of how we are going to proceed.

Now to talk about the issues that the team is address, the very first big tranche of
issues -- and every time I use that word my staff makes fun of me because they would prefer I use it
only in financial areas -- but the first big group of issues would be authority, privacy, and also the
whole liability issue, which is important to the industry.

So, first of all, with regard to NHTSA's authority, we clearly have authority to set
standards that manufacturers must apply to new vehicles and equipment. We also have ability to
set standards for equipment not necessarily in the hardware sense, but also in software applications,
and so on and so forth. That whole area is beginning to develop. But if it really is critical to
motor vehicle safety, then we believe we firmly have jurisdiction.

But we are used to setting standards which actually, again, go to a particularly-defined
problem to which we can apply a particular kind of countermeasure, whether it is putting in
seatbelts and whether it is electronic stability control, whatever it might be. We have got a
population of that is threatened by a certain kind of crash. We have a countermeasure that we can
put in place. We can set a performance standard for that countermeasure.

Here, in order for vehicle-to-vehicle communications to actually be implemented and work, in addition to that kind of standard, there has to be a mechanism to ensure that the communications are secure. And that is an ongoing operational kind of arrangement that NHTSA has not previously been engaged in in terms of creating it. So we can talk a little bit, when we talk about the security area, how that might work and what the current model is.

But, again, this is a different kind of exercise for NHTSA from what we have done in the past. Of course, we have authority over vehicles and equipment after their birth and manufacture through our defects investigation process. If you have ever had a recall for safety on your vehicle, it most likely was what was a defect issue, and it is required by the manufacturers that they do recalls for those kinds of risks.

But we don’t operationally control anything out there on an ongoing basis. And the kind of infrastructure that would be necessary -- and I am not talking about roadside here; I am just talking about the security system -- the kind of security system that would be necessary to implement V2V is something very different for us to do.

And so, therefore, we are exploring various options for how we do that within our existing authority. We think that if we were to simply wait for Congress to provide different authority, we might be waiting a very, very long time.

(Laughter.)

So, we are thinking that we do have the authority to proceed, and I will explain a little bit more about that.

Now privacy is a major issue. You know, we had, many of us here in the room, including
Greg Winfree and Ken Leonard and Valerie Briggs and Nat and Tim and I were in Detroit earlier this year talking one-by-one with the manufacturers about V2V and what their visions are, and what ours may be.

And one of the biggest issues, from their perspective and from ours, of course, is privacy. Everything we do these days seems to have a privacy element. We have proposed a rule a NHTSA on event data recorders for the remaining 5 or 8 percent of the fleet that does not have them in terms of new vehicles. That created a firestorm when we proposed it with articles about, you know, Big Brother in your car and NHTSA being a snoop, and so forth.

These are very basic event data recorders that, as I say, are in most vehicles now that are now tracking devices. They are not data loggers. They are event recorders which are overwriting all the information unless there is a crash in the preceding five seconds.

And so, even with that, people are enormously concerned about privacy. Anytime the government is involved or major a manufacturer is involved, and there is information in your vehicle that might be going elsewhere, then people are very concerned.

So, in public pronouncements, we in the Department have tried to explain that V2V is not about tracking or snooping, and the basic safety message certainly is locational, but is evaporating immediately and is there for a purely safety purpose.

But, generally speaking, those who are most concerned about private, which is a very valid concern, aren't necessarily buying what we are selling in terms of the privacy aspects here.

So, we and the industry are quite concerned in terms of making sure that (a) we minimize in this process any intrusion of privacy, but also that we analyze, if it is necessary at all to have any impact on privacy, that we thoroughly analyze it, as the law requires.
Anybody want to discuss that or broach that topic? It is really something --

CHAIR DENARO: I have got a long list here, but I am going to wait.

MR. SMITH: Oh, okay. All right. Well, don't wait until the clock runs out. We have got plenty of time.

So, liability is another area that is of significant concern to the manufacturers, the OEMs. For one thing, as they explained it, any safety feature they build in their vehicles now, they control and it applies only to their vehicle. In vehicle-to-vehicle communications, to some degree, whoever is driving Company A's vehicle will be dependent on signals from Company B, C, D, and E, and may even be dependent to some degree on a signal from an aftermarket manufacturer, which is building some device anywhere in the world.

And so, there is this whole issue of the ability to trust messages coming from other folks' equipment and vehicles, which is very, very new for the industry. Again, the concept is, is it kind of a uni-vehicle kind of a safety system in which it is self-contained and it is sensing and using cameras, and to make its decision, or is it now getting messages from the outside on which it may either provide a warning or, ultimately, perhaps someday actually affect a control function?

So, the liability there is obviously a concern to the industry. We don't have any authority to restrict lawsuits or dictate the extent of liability, or anything like that. But in terms of what our team is working on -- again, that is kind of a long list I am going through here -- they are looking at what the legitimate concerns might actually be with regard to liability and whether or not we need to recommend anything in that regard.

And one way that we might do that -- I get to after-market equipment -- and one way we might affect this, of course, is to require that aftermarket equipment go through kind of a rigid
certification process to create greater confidence in the messages it might be sending.

Interoperability is a big issue, but certainly not in any way insurmountable. Again, you have got various manufacturers. You have got various devices. All of this is still quite experimental, I would say. And yet, we also have folks elsewhere in the world working on the same types of technology. And so, we are trying to ensure that, if we are going forward, we are going to go forward in a way that provides for interoperable technologies.

Security, as I said, is a huge issue because the messages themselves need to be accurate and timely and their transmission needs to be protected. We need to know that, if I'm getting a message from your vehicle, my vehicle needs to know that it is a legitimate message from a respected, acknowledged source, and all of that has to happen in milliseconds essentially and constantly.

So, the challenges are large, but I think, again, technologically, not insurmountable.

There are methodologies which others can go into in more detail which we think will work and have been demonstrated in other contexts.

Again, the question is ensuring over the long-term that that security system functions properly. If there is a vehicle or device out there that is now functioning or there is an actual bad actor trying to invade the system, how does that get rooted out? How does that get kind of excised from the system? How does the driver of a vehicle that might be sending a bad signal even know that their vehicle is doing so?

So, all those are complicated, very real issues in security. But, again, it is kind of the back-office issue that is kind of tougher than the technological issue. How do we set up an organization, or how does the industry set up, with our encouragement, an organization, or how
does some third party set up such an organization that will help deal with the security on an ongoing basis?

Standards and harmonization is another one of our subteams. And all of these issues are handled by various subteams within our larger V2V team.

Here, you know, RITA has been dealing with folks around the world, as have many of our staff, on these issues in terms of the various V2V systems that are being developed in Europe and Japan, particularly. And so, what we are looking at is what is out there now and what gaps there may be. There are IEEE standards. There are all kinds of standards out there for these basic communications. And certainly, those who are deeply enmeshed in this can explain those standards, and I can't.

But what the subteam here is doing is trying to, as I say, highlight what is there, and then, figure out, okay, if we are to do a standard, what should we incorporate. What other standards might be necessary? What standards are in flux? And several of them are kind of in flux with kind of new versions and adaptations kind of around the corner. So, where do we find the stability in those standards that we might incorporate into a proposed rule?

Aftermarket devices, as I said, are a large issue. But when you think about it, let's take Ford or GM, if either of those manufacturers were to provide a wonderful crash-avoidance system in their vehicle, it would be effective when you leave the showroom, right? It is a uni-vehicle kind of system, dependent upon radar cameras or fused systems, or whatever. It is not dependent on anything else. It is not picking up signals from other vehicles or the infrastructure.

But the problem with V2V -- and it is a problem -- is you can have a wonderfully-equipped V2V vehicles, and it is not going to do you much good if no one else on the
road is equipped, right? So, we talk about day one. That is the first day in which there would be a
rule that would become effective that manufacturers would, if we do a rule, have to equip their
vehicles.

And then, the question is, okay, how do you get market penetration to the point where you
are actually going to kind of reach that point, that takeoff point, where you are really going to have
some effectiveness, where you have got enough vehicles out there communicating with each other,
that you are actually going to reach some critical mass of effectiveness?

And the aftermarket devices, which are being tested out in Ann Arbor, which, again, are
prototypes, certainly would offer a significant leg up in terms of the market penetration rates. The
question is, who would buy them and why?

Again, let's say it is the year 2020, and NHTSA has done a rule, and manufacturers are out
there putting these things in their vehicles. Then, what is the incentive for a driver of an older
vehicle to actually get this aftermarket device at a reasonable price and put it in their vehicle, in the
hopes that it might be protected by an encounter with some of these new vehicles that have this
technology?

So, there is a question there in terms of the market draw. And there is the question I
mentioned before where the OEMs are reasonably concerned about who is going to be producing
these devices and how they are going to integrate with what is in their vehicles, and how to ensure
that those aftermarket devices are not just coming in by the boatload from somewhere else,
untested, and possibly sending out confusing or detrimental information to other vehicles.

So, the long and difficult discussion in terms of how we get the benefit of the market
penetration of aftermarket devices, but at the same time have great level of confidence that they are
actually going to be as safe as what is in the OEMs' vehicles.

And then, of course, the applications themselves. Right now, the reason NHTSA is doing this, (a) we have got the regulatory authority, but also we are the safety agency. There are so many other applications in V2V, as you all know, that are going to create value, but our jurisdiction is limited to the safety applications. That is what we are primarily focusing on, although there are a couple of others, I guess, being involved in Ann Arbor.

But our focus is on the safety applications, and what we are trying to figure out on the team, the applications subteam, is trying to figure out what kind of requirements we would place around those applications.

So that, if we take, for instance, one of the most notable applications is the Intersection Movement Assist application, something that perhaps the best example of where V2V would provide a kind of safety advantage that onboard systems maybe at least at this time unable to provide, because the radars in their gaze and the cameras in their gaze are not necessarily going to tell you what is coming at right angles or other angles into your path. And yet, we have a lot of death every year in these intersection crashes.

So, the question would be, if we are to do a standard, then what kind of requirements, what kind of parameters would we put around it? Would it be an application that works at specific angles of approach? Because the more you get away from 90 degrees, perhaps the less tested that is, and perhaps the more problematic it may be in terms of proper warning, proper time. There is confusion in terms of the more extreme angles in terms of whether it is a parallel movement or not.

And so, we have to figure out, okay, what application would we really want there? And then, how in the world would we test for it? Because that is kind of NHTSA does. If we are
going to require the manufacturers to do something, they are going to want to know how we are
going to test for compliance, because we will test for compliance.

And therefore, we have got to think about, even though this year we don't have to develop
a full compliance test, we have to know whether or not we could ever get there. We have to figure
out, okay, if we define this application perhaps in one of these two or three ways, would we be able
to develop a performance test that would be objective and repeatable and reproducible there,

essentially, that would get us the benefits that we want?

And the final issue that the teams are dealing with, of course, are costs and benefits. That
is what rulemakings are all about these days, particularly one like this which would be clearly

significant.

I think I mentioned earlier, talked about the rulemaking process, that a rule that is

significant requires review by the Office of Management and Budget, both post-stage and, then,
after all the comments are in, back at the final stage. That review can be very intense with a very
close scrutiny as to what the likely costs and benefits are.

So, our economists, working with our engineers, working with our lawyers, working with

our RITA colleagues, and everyone else, were trying to figure out, okay, if define certain
applications that would be part of the initial day one approach here, and we have performance

standards that will work, and we have dealt with aftermarket issues, and we have clarified it, we
have dealt with all of that, now do we have enough in terms of benefits that we can actually reliably
predict, and can we reliably predict what costs to the industry would be in a way that we would
have a cost-beneficial rule?

So, again, if you go back to our normal rulemaking, it is a little easier to ascertain those
questions because we have got a particular technology applied in a particular setting. We know
how many people are dying every year in that particular setting, and we have a really good idea as
to what it is we are thinking of requiring that might actually ameliorate that problem.

Here, again, the effectiveness depends largely on kind of reaching a critical mass, so that
there are enough encounters of vehicles, of equipped vehicles, that are actually going to have that
effectiveness. And then, with regard to each application, we have got to figure out how effective it
would be.

So, that group is hard at work now, but to some degree they need to know how all the
other subteams are coming up, so they know kind of what they are aiming at. So, this whole
process is -- you know, we have got it timed, so it is going to work this year. But I can tell you that
it is the whole chicken-or-egg going on sometimes because one subteam will say to the other,
"Okay, you need to clarify the scenario at which we are aiming in terms of," be it authority or cost
and benefits. And the other group will say, "Well, we are still receiving information and we are
analyzing what is going on in our group," and so forth. But we are getting there.

So, in addition to all of those issues that our NHTSA team is looking at and the subteams,
there are these overarching issues. You are going to spend a lot of time today, I think, on
spectrum, and you have got Walt Fehr here and others who are experts in spectrum who will delve
into all of that.

But, from NHTSA's perspective, the 5.9 is kind of the lifeblood of the system. And so,
we are going to proceed under the assumption that we are still going to have that spectrum available
and it won't be shared in any way that would impinge upon the safety applications. But we
understand that that is a larger question that is in need of resolution.
There is also this interplay with the manufacturers' crash-avoidance techniques or technologies and V2V. I mentioned that earlier. The manufacturers are rapidly moving in a direction that would provide significant crash-avoidance benefits. A lot of vehicles out here today are equipped with either warning systems that tell you when you are wandering out of your lane or when someone is in your blindspot.

Increasingly, higher-end vehicles, in particular, are equipped with active technologies that are going to apply the brakes for you or assist you when you apply the brakes in an emergency stop. Some are developing lane-keeping technologies, and some are beginning to combine lane-keeping with automatic stop, so that for a while you can have your hands free and your feet free. And then, you go beyond that to more technologies.

All of those are out there. As I said before, the question is, okay, well, are there still benefits to had from V2V, even though those technologies are starting to be with us and rapidly developing? That is one of the things that we are chewing on.

We currently think that, yes, there certainly are benefits that V2V provides and that they all will complement each other, but reasonable minds can differ on that.

Finally -- and I will shut up in a minute here -- the other set of overarching issues which are not directly in NHTSA's purview relate to V2I and the states. We will in our cost/benefit analysis and in our whole large report that we are going to come out with here to support a decision, we are going to be speaking to what we would like to see or what we hope to see, or what we hope is developing on the V2I side as well.

We know that AASHTO is doing its deep review on that. We know that Federal Highway has its own game plan. We know that JPO is masterminding all of this, and that Greg
Winfree has his finger on the pulse of exactly what is going to happen in the V2I realm.

But it is really important, I think, that we have a fair concept in terms of where that is going when we proceed. The benefits that are going to be available from the V2I part of this system will go beyond safety, but we think will help certainly make such a system more cost-beneficial and, also, help overcome some of those kind of deep-seated privacy concerns that might be out there where the public is going to see greater benefits of various kinds. Then, there may be less kind of paranoia about some of the safety aspects.

And we have kicked around what can happen on day one that might be important, important to V2I development. Ken Leonard has some ideas in that regard as well in terms of what might be helpful, even for work zones, and kind of simpler, easier applications that might demonstrate very readily to people with equipped vehicles that, even though they are not necessarily encountering a lot of other vehicles that are equipped, they are encountering some infrastructure that is equipped, and their V2V technology allows them to communicate with it.

So, that was a long-winded description of what NHTSA is working on. I probably left out something or other. And I don't know whether Nat or Tim want to add. Or shall we just start talking?

CHAIR DENARO: Well, I will start with a question. I am sure that many have more, too.

First off, can you give me a feel for -- you did a great job. And by the way, thank you very much. I think we all learned a tremendous amount from what you said. So, it is extremely helpful.

You said that you have got subteams and teams. What is an estimate of an approximate
size of the amount of staff that are on this issue, the whole rulemaking for V2V?

MR. SMITH: Well, I think at last count we probably had 28 to 30 or so kind of working on it. That includes a couple folks from JPO. That includes people from all the different parts of NHTSA that I mentioned. And they are not working necessarily full-time, although some are. Particularly our team leaders are pretty much working full-time on this. Team members have their day jobs as well, but this is a primary focus.

CHAIR DENARO: Okay. Thank you. You obviously do a lot of research, and you mentioned a lot of research you had to do with this. Is all of your research through the JPO? Or do you directly sponsor some research yourselves as well?

MR. SMITH: Well, we do a lot of research on our own.

CHAIR DENARO: Okay.

MR. SMITH: In this context, it is virtually all with JPO. But, in terms of vehicle automation, we also have our own research. Tim or Nat may wish to speak more to that.

MR. JOHNSON: Yes, 100 percent of our research on connected vehicle has been through the JPO. As we move into other technologies like automation, it is going to be a mix probably.

CHAIR DENARO: Okay. And with regard to that, what is your process in deciding what research you need? I mean, there is a plethora of issues here. You went through them, everywhere from almost policy issues to technical issues, and so forth. What is your process for deciding what research you need prior to getting to a decision, and so forth?
MR. SMITH: Well, Bob, you mean specifically in this context or generally speaking in
the --

CHAIR DENARO: In this context, yes.

MR. SMITH: Well, I mean, Nat and Tim should speak. But, essentially, what we are
looking at now on the technological side is where the vehicles that are fully-integrated vehicles
created by the OEMs, and so forth, you know, what their capabilities are, what issues they might be
showing out in Ann Arbor, and so forth.

And so, what our teams are doing, knowing what we would include in a rule, if we do one,
they are looking for kind of gaps of knowledge that we could fill in with additional research.

Nat?

MR. BEUSE: Yes, about the only thing I would add, I would say it is really a
coordinated effort between NHTSA and JPO and Federal Highway, basically an intermodal kind of
thing to start out with.

But, as Dan explained, what is going on right now is a lot of that research was either
ongoing or already planned. So, what this team is doing is kind of assimilating all of that, really
kind of going through it and trying to make some decisions about these gaps that Dan mentioned.

And we actually just planning meeting about last week, I guess, sometime with JPO to talk
about some of those gaps, so to speak, that the team sort of thinks that are there, and then, whether
or not more research is needed to kind of go through that.

On the broader context, generally, we kind of do our planning in two ways. One, we kind
of go through an internal process for looking at sort of the bodies on the road, so to speak, what
countermeasures are out there. Where are we in terms of developing test procedures or
cost/benefit and things like that? And we develop a rulemaking research priority plan.

Once we do that, we put that out to the public for comment. We get comments from all sorts of people, stakeholders, manufacturers, you name it, and we take that into account, maybe make some revisions, maybe put some more things on the platter. And that sort of sets the stage for a three-year one.

On top of that, we generally have a NHTSA strategic plan that is sort of more overarching and broader to try to help guide some of those near-term things. Of course, kind of what happens is time goes on and things come in from the Hill, from a statutory mandate perspective, and so those get added to the platter. Those have to be researched if we don't have anything ongoing, and they get ratcheted-up on the priority list.

Sometimes the Secretary comes in and says, "Hey, there are certain things that I want to get done and get focused," that gets added to the plan. Lots of research goes on there.

But in the context of V2V, it is much more of a collaborative effort between the agency, manufacturers, intermodal within DOT, certainly input from you guys. We are really trying to look at right now kind of where those gaps are in the research.

MR. JOHNSON: Yes, I mean, I would just add that, you know, specific to connected vehicles, there was a lot of planning upfront on what are the major tracks of research that we need to perform. And so, there were things like starting with the data and identifying what type of applications might match the safety problem, developing countermeasure requirements, and then, going out to folks like the CAMP consortia, and asking them to develop those types of applications that map to those crash problems. So, that is one aspect of it.

Of course, the safety benefits --
CHAIR DENARO: So, you will use research from someone like CAMP, for example?

MR. JOHNSON: Yes, heavily. Heavily. Absolutely. All in terms of our decisions.

And there are other major tracks of work that I think we have presented to the group, and we could certainly bring that back in and talk to that again.

But Dan mentioned the security piece. That has always been known, that you have to create this trusted environment. There is a myriad of standards that you have to do. You have to define the message set, and then, standardize around that. So, that is a significant effort.

Dan also mentioned interoperability. This technology has to be scalable to perhaps hundreds of vehicles operating in close proximity.

So, just a number of things that we had laid out and carefully vetted with big groups like this. We had a number of workshops to vet that plan. Certainly through our interactions with various industry stakeholders --

CHAIR DENARO: So, basically, you are mining all these sources for --

MR. JOHNSON: Right. So, that is the body of work that we have really lined up for this 2013. A good bulk of that will be done and synthesized together for our decision.

As these folks mentioned, certainly there are gaps that you uncover. I mean, the plan is not perfect from the get-go. So, we are, through our team effort here, perhaps there are gaps that we need to do additional research to fill that. And so, it is kind of an iterative process here.

CHAIR DENARO: And so, one step a little more detailed, and this is just something I have wondered about, I have suggested for this Committee that one of our goals is to identify potential threats to deployment. And then, can we step in and recommend research, or whatever, to basically tackle those gaps?
You know, if I had a metric of success for us, and we were going to be around long enough to see the final outcomes, it would be whether this thing successfully deploys and did we identify those gaps upfront sufficiently, such that we smoothly move into deployment and this thing goes great.

There are any number of factors that can kill a system, you know, publicity and all kinds of things. Okay? So, where my question is going here, if I look back just as a consumer, my personal experience with seatbelts and airbags, there were certainly side cases. My sister back in the day would say, "Oh, but if the car catches fire and I'm in a seatbelt, that is one time when I don't want that seatbelt on." Everyone had their little corner case of where the particular technology was not going to help you. Certainly, that is going to be true of this.

So, my question is, what is your responsibility for investigating those corner cases where, in fact, it could be a problem? So, how often will the positioning system be off sufficiently to cause a problem, a misalarm or a false alarm? What is your responsibility in those kinds of things?

MR. BEUSE: So, that is a very good question. That is one of the things that the team is looking at.

Dan sort of alluded to it, but I will put a different spin on it. Kind of the way the team was looking at it is to figure out some of those key issues first, and then, to kind of sit at the end and kind of figure out what the implementation strategy and plan are.

There are actually two issues there. Dan mentioned we went to Detroit. One of them is communication, not communication between the vehicles, but communication with the public in what this thing really is.

You know, the EDR case is a very good reminder about how you can kind of not take
some of these things for granted. I think that, with this technology, in particular, there will be lots
of folks out there spinning all sorts of tales about what this technology really doesn't do.

So, certainly, we have already recognized that as one area that will need to be fleshed out,
depending on what we do with the decision. It is sort of one of those things not quite
chicken-and-egg, but it is sort of strange to kind of develop a big communications plan if you don't
really know what you are doing and start talking to the public about, "Hey, we are going to roll this
thing out." Then, all of a sudden, we find out we have lots of issues that we can kind of figure out
solutions for.

MEMBER HAMMOND: What is EDR?

MR. BEUSE: EDR? Oh, I'm sorry. Event Data Recorders. Yes, you have to catch us
sometimes because we do acronyms. I am notoriously bad about that.

MR. SMITH: That is our rulemaking proposal that created a firestorm late last year,
when it is simple event battery as opposed to something more complicated like this.

MR. BEUSE: Right. The other issue is the sort of day-one benefits. We think that is
one area that we have to focus on that we probably would not have focused on normally in our way
of thinking, right? So, that is another area where, again, the team will look at it and say, okay, how
can we, if we are going to go forward with a rule and deploy this onto the public, there is going to
be an expectation that there has got to be some benefit. I just can't be buying this stuff and there is
no benefit. So, there are certain day-one benefits.

Questions?

(No response.)

The other thing or some other things, which are kind of in the weeds, but how many
security certificates do you need on day one? Do you really need this entity that is set up day one? Those are all questions that the team is really kind of churning about to look at.

And certainly, if this group has other things that they think we should look at, I can't imagine we would not want to hear those.

But it is under our task. This team is looking at some of those very, very hard issues. The manufacturers are looking at some of those very hard issues.

Because you can imagine, just from a certification standpoint -- and Dan didn't really get into that -- but in order for a manufacturer to sell a vehicle on the roads that is compliant with FBSS, they have to demonstrate compliance. And so, how are they going to do that if there is no entity set up day one? So, those are all great or real questions just in terms of going forward.

CHAIR DENARO: So, you mentioned fleshing out some of those issues.

MR. BEUSE: Yes.

CHAIR DENARO: Let me just give a concrete example. There are any number of possibilities, but one I can envision is, if, due to some feature in the system, there is a false alarm and somebody slams on their brakes and gets rear-ended --

MR. BEUSE: Right.

CHAIR DENARO: -- the press is going to love it. Okay?

And so, do you have a responsibility to actually go in and say, "Okay. Here is the percentage of time this might happen or the number of occurrences there might be per thousand interactions," and whatever, "and here's the possible consequences?" Do you go into something like that?

MR. BEUSE: Absolutely. So, part of the rulemaking -- let me take my research hat off
and put my former rulemaking hat on.

Part of when we do a rule, there are three things that we have to do under the statute, right? And one of those considers the idea of sort of public acceptance. And so, now you go into public acceptance. You can't really deploy something and write a rule on something that is going to cause mass confusion or drive consumers crazy, or anything like that.

So, yes, we would have to consider those, how many false-positives or false warnings or false activations, and all that kind of stuff, and figure out what does it mean. So, it kind of speaks to practicalities. Is it really practical?

And San is also very familiar with the statute. I don't know if he wants to add anything, but that is a key consideration of any NHTSA rule.

CHAIR DENARO: Okay. Just two other questions. Then, I know the rest of the Committee will have questions.

I am just curious, why did you have a decision to start with the passenger car and then later go to trucks? Why not the inverse order? I am just curious.

MR. SMITH: First of all, thank you for underscoring that, though, Bob, because I didn't. 2013 is the decision for light vehicles and 2014 for heavy.

But Tim can probably speak to that --

CHAIR DENARO: And the reason I am asking is that it seems it might be easier to go with heavy vehicles first, but --

MR. JOHNSON: Yes, I think it is just as simple as that is where the bulk of the benefits are.

CHAIR DENARO: Okay.
MR. JOHNSON: And that is where the kind of critical mass and interest is when we start the program. It is on the light vehicle side.

MR. SMITH: And there are some different challenges, right? We still are working on sort how do you know from a basic safety message standpoint what to do with a trailer, right? I mean, there are some really hard technical issues there that really aren't there on the light vehicle side.

I mean, certainly, when you think conceptually, okay, yes, truckers might be more willing, and things like that, but there are technological --

CHAIR DENARO: Yes, I saw some of your writeups on that. Yes, I understand that. And then, my last question, then, is, you know, I think the benefits here are amazing, and you are certainly on the right path. You stop short of going to control. You went with warning. Does this have to do with liability concerns?

MR. SMITH: So, I will try it, and the folks who actually understand it will correct me.

(Laughter.) But the reality is that, as I said, there is this whole kind of stream -- I think this is like streams of innovation that are out there right now.

With regard to onboard crash-avoidance technologies, they are essentially using software to make decisions that are safety-critical. And so, the manufacturers are themselves wrestling with, okay, well, what is the precise algorithm I want to apply in a situation, for instance, with automatic braking? How close do I want to get to that vehicle in front before I am going to automatically brake? Because if I do it too often, then you have got the acceptance issue and perhaps safety issues.
And so, there are struggling with all of that and making decisions. So, the question is, you know, V2V basic safety measures and other inputted data into a vehicle that may have no onboard safety equipment, which is the majority of vehicles out there right now, no onboard active, but with regard to a vehicle that does have active safety technology, then the question is -- and the OEMs are quite clear about this -- they want to get to the point where they have a confidence level with regard to the integrity of that basic safety message, that they could incorporate it into their decisionmaking algorithms, right?

So that, without that confidence level, which deals with, again, the aftermarket equipment issue, with dealing with some other manufacturer's stuff, with dealing with possible hacking of the system, without that confidence level, they are not positive at the beginning they would want to use that bit of data in their decisionmaking algorithm. They might use it as a pre-warning, as an advisory, in combination with all the other data, to help make that decision.

But one thing I would continue to emphasize is that there are scenarios where V2V is going to provide data input you don't otherwise have. Intersection Movement Assist is one of the leading examples of that. And so, therefore, in that context, we, as an agency, could conceivably require that it be used as a control technology in, say, the intersection context.

But, right now, we are really looking at the warning context because all of this is so new. The integrity of the basic safety message has to be completely proven. And meanwhile, the automated technologies, the active technologies are themselves being proven.

So, I don't know if that helps, but --

CHAIR DENARO: Yes. Let me just say a comment, and then I will shut up.

I am so pleased to hear you say that V2X or V2V really augments existing sensors and
doesn't have to replace them. It is the first time I have heard that from the whole team here, and that is kind of a personal hot button of mine. You know, let's not say we have to throw away all the sensors on the vehicle, which is certainly a benefit. So, thank you for saying that. I am glad to hear it.

MR. SMITH: I mean, I think that is kind of reality.

CHAIR DENARO: Yes, it is.

MR. SMITH: But I think, again, if it is either/or, I just think that is mistaken in terms of the logic.

One point, Bob, just to get back to the dialog we had with Nat on, for instance, like false-positives, we look at that not just with regard to the acceptability of the technology, but we also weigh it in trying to figure out whether it is ready for application, right?

So that, with regard to -- set aside V2V -- with regard to Nano brake support or with regard compression in automatic braking, we have got to figure out, if we were to require such technology, would we be causing more problems than we are preventing. Or would there be enough false-positives to actually create some disincentives to the technology? So, all of that is part of our calculation and analysis.

CHAIR DENARO: Great. Thank you.

MEMBER KISSINGER: I have a couple of process questions. From my experience, once the agency starts a rulemaking process, you seem to shift into a listening mode and there is less of a dialog anymore with external partners.

MR. SMITH: Listing or?

MEMBER KISSINGER: Listening.
MR. SMITH:  Oh, listening, okay.

MEMBER KISSINGER:  Is that true?  And if so, in this context, will that kick in at the end of the year?  Will that kick in at some point in 2014, if there is, in fact, a rulemaking initiated?  And if so, does that apply to this group?  Or do we have a special role to play where we can still engage, in effect, in conversation?

MR. SMITH:  Excellent.  Excellent question.

The whole reason that the agency goes into listening mode, again, the purpose of the notice and comment procedure in rulemaking is to ensure that everybody has the same access to the decisionmaker.  So that, you publish a proposed rule, and everybody has the same access.  So, if we meet privately with any entity, then that gets docketed or documented and put into the docket, so that if someone comes in and tries to persuade us of "X", somebody who thinks the reality is "Y" has a chance to also persuade us and make that very public.

However, that doesn't even kick in until there is a proposal, an actual NPRM.  We are not doing that this year.  This year's decision would not draw any line in the sand in terms of continued dialog.

Plus, I defer to -- and Greg still has his counseling hat on -- some of the law in terms of this Advisory Committee.  Is this an organized FACA Committee, Greg?

MR. WINFREE:  Yes, it is.

MR. SMITH:  It is?  And certainly, however, its charter probably goes to advising RITA as opposed to advising NHTSA.  We don't have a relationship necessarily with the Committee.  But between the Council and the two agencies, we could determine whether or not we could continue to have that kind of dialog.  It may not be possible.  It may be that, if we continue to have
this same kind of discussion, the law is that we take some notes and have to put it in the docket
after we --

MEMBER McCORMICK: It is to advise the Secretary. So, it covers all of the agencies
and administrations.

MR. SMITH: Okay. Well, again, we will look at the charter. Since we are not party to
it, and we have a regulatory role, it may not be quite as clear as our being able to continue in an
Advisory Committee open role.

CHAIR DENARO: Just to clarify that -- and, Steven, if you are still here -- our charter,
you know, we essentially report to the Secretary. Okay? And now in the legislation there are
things we are supposed to review. Our primary review is JPO activities, but we, as a Committee,
have said, "So we are going to do our job. We are going to comment on the JPO strategy, the JPO
program, and so forth." But since we do look over the entire DOT within this subject of ITS, we
are the ITS Program Advisory Committee, within the subject of ITS, if we care to make comments
that go beyond the JPO, maybe out of their jurisdiction or whatever, we will do that.

So, by inviting you here, you know, we are going to say, "Well, we might put some things
in there directed for NHTSA." Even though that is not directly with these guys, and you guys are
different, we get to do that. Whether anyone cares or not or responds is another thing.

(Laughter.)

MR. GLASSCOCK: Yes, the Committee's advice is to the U.S. DOT Secretary. It is
concentrated for our program, but it can address anything under the DOT umbrella.

MR. SMITH: That is helpful.

MR. GLASSCOCK: It is to the DOT Secretary through us.
MR. SMITH: Right, that is helpful, but, again, given my legal background, I can tell you that it isn't necessarily as simple, given our statutory construct, and so forth, in terms of how we can continue to communicate.

But that is like down the road, if we propose a rule, when we propose a rule, and we will get that resolved by counsel beforehand. And hopefully, the dialog can flow.

But since there are transparency requirements under the Advisory Committee Act anyhow, then, as long as the communications are transparent and docketed, I can't imagine that we wouldn't follow them.

VICE CHAIR KLEIN: Dan, will the V2V regulations, will that in any way put NHTSA in a different kind of role than it traditionally plays? NHTSA is traditionally a regulatory agency. There is a little bit of an antagonistic relationship with industry.

But, in the case of V2V -- you are receiving technology that is coming out of a JPO/industry collaboration. It is a continuation of a collaborative interaction. That collaboration has encountered certain challenges to implementation, but the challenges are in some respect a collective action problem, as we say in academia.

It is hard to get everybody to adopt the technology at the same time. And that is where a regulatory agency can play a powerful role to facilitate implementation. So, even as you are regulating, there is regulation on the regulation. And it almost looks like this is the kind of regulation that would facilitate the implementation of a technology that everybody supports. So, it puts NHTSA almost in the role of an implementor rather than an antagonistic regulatory. It is almost collaborative regulation potentially rather than antagonistic regulation.

And is this a role you have been in before? Do you see a different kind of collaboration
between the public and the private sector in this technology?

MR. SMITH: That is a really good observation and very perceptive. It does differ to some degree, but I would say that, although, yes, we are a pain in the neck to the industry in some regards, we also collaborate with them on research right up to the point where we are about to do a rule.

So that many of our rules are the product of collaboration with like the Society of Automotive Engineers on a wide range of subjects, before we even get to rulemaking. But, then, of course, we are a regulatory authority. So, we do, in fact, enforce the rules that we issue. We do, in fact, do investigations. And that is kind of part of what you are talking about, I think, in terms of the kind of antagonistic role.

But the industry is very mature. The industry understands the different phases and roles that NHTSA has. And so, Steve, for instance, for the Board, has a broad purview, understands that on a Monday we might be in a heated debate about whether or not they have to recall some vehicles that are eight years old that might cost a lot of money. And then, the next day we are having a very calm conversation about subjects like this.

And so, the industry gets that. You know, they don't like our enforcement role. I mean, who would? And we are really kind of aggressive in that regard. I used to be the head of enforcement. But we have other roles to play, and the industry gets that.

But this is different, you are right. To the extent that we proceed, then we are, in effect, saying this technology works; this technology should be implemented. But we do that to some degree with certain other aspects of auto technology, right? I mean, whether it is airbags or whatever it is, we don't wait until the entire industry has it, although ordinarily some percentage of
vehicles do.

This is different, as you say, because we don't think that any vehicles are going to be equipped with DSRC capability unless and until we were to require it. Maybe we are wrong in that.

So, yes, this does to some degree -- it is new and it is huge in its ramifications, and it applies into infrastructure. We have never had anything that might ultimately play into the infrastructure. Plus, there is that post-rule phase where the security system has to be up and running.

So, it is very perceptive. It is different, but I don't think there is a conflict of interest on our part. Any safety technology that we think is going to save lives, we have got the authority and got the responsibility to require.

MEMBER STEENMAN: Dan, a quick tag onto that related to the privacy comment you made earlier and so many issues. We have seen over the last few years, particularly in the social media space, citizens are so willing to give up a tremendous amount of privacy, as long as you incentivize them and they see a benefit.

So, is NHTSA also in this space of regulation versus incentives thinking about in terms of opt-in, building incentive structures for people to just willingly participate and give up all these data, because they get something back?

MR. SMITH: Well, interesting, first of all -- and correct me if I am wrong, those who have greater expertise here -- but I don't think in this particular situation we would be asking individuals to give up any data. In other words, their vehicle is constantly transmitting data that is, then, evaporating and not necessarily being recorded.
The question is whether or not their locational data and other things can be exploited for other purposes perhaps. But I think that we generally would not -- particularly in a situation where market penetration is kind of vital to achieving benefits, I am not sure that we would rely on an opt-in system unless there were features of it that could be switched on and off, you know, beyond the safety portion of it.

In other words, if there were some aspects of the communication that went beyond safety, for whatever purposes those might be, if people could opt into those, if, in fact, some data about their vehicle is being transmitted to others, then they could opt into that. And obviously, we have no objection to that. But we generally, if we really see a safety benefit that has to be pursued, we wouldn't rely on an opt-in system.

MEMBER McCormick: Well, if I can tag onto that, you talk about the privacy policy. The federal government has no regulation governing personal information. They have tried to enact that several times. They even looked at the EU's Digital Privacy Act, and weren’t able to act on that.

The only actual guideline they have is on how you create a privacy policy. The only thing that was enacted was in 1995 by the Federal Trade Commission on what is considered to be non-binding guidelines in terms of appropriate use of personal information.

The federal government uses a sectoral approach in terms of looking at both regulation, self-regulation, and looks for the industry to regulate itself in terms of that. And there is, in fact, only 24, I believe, total privacy regulations, and they are very industry-specific. They deal with your financial transactions, your information on your medical information, the HIPAA things.

You are now kind of in a unique situation because, for one, given how the government
approaches private policy, it is very unlikely that you would ever have one enacted. There is no
history of ever it happening.

Most of the privacy legislation, I believe there were four pieces of legislation in Congress,
were all written by legislators, litigators, and consumer privacy advocates, and all of them failed.

But now you are requiring that specific information be delivered from the vehicle. And
even if that is only the certificate, okay, and even if it is only evaporating, there is no means that you
can possibly protect that information from being harvested.

And so, now you have gotten to the point where for the first time you are going to be
requiring a commercial device to transmit specific information that is personally-attributable. And
right now, everyone that has one of these is doing the exact same thing.

I know what you are going to say, but just let me finish where I am going here.

So, the real question is that, when you talk about privacy, it really has to be either an opt-in
scenario -- that is the only one that any of those 24 pieces of regulation actually use, is that when
you sign a hospital document, when you sign to have your car repaired, you are authorizing them to
give up that information.

And so, it presents for you a very unique situation as to whether or not you can actually
create the privacy policy. And in the end, that is probably just going to be also only a
recommendation as a non-binding issue to industry.

And now the question is, who would be the self-regulators? Is it the automakers? Is it
telecommunications? Is it the switching network? So, I am not really sure how that problem gets
solved.

Walt had to stand up when I said something.
MR. FEHR: The issue I was going to take was with your characterization of transmitting personally-attributable information. That is not the case.

MEMBER HAMMOND: A certificate is. It is attributable to my vehicle.

MR. SMITH: Not necessarily.

MR. FEHR: Not in the way it is transmitted. In the course of transmitting a basic safety message, it would take access to information that is closely-held in order to do that. It is not something that just goes over the air.

MEMBER McCORMICK: Well, I understand. I understand the encryption. I understand that it is --

MR. FEHR: And no one entity can identify that.

MEMBER STEENMAN: But even if the data, even if the DSRC has meshed into autonomous capabilities or advanced drive-assist capabilities and gets meshed into a bigger dataset, it escapes this small little system. Now it exists in a car. I think we will have to do a privacy scenario.

MR. SMITH: Well, we definitely have to deal with the privacy issues; there is no doubt about that. But we are not necessarily going to legislate on this issues. We are going to analyze the heck out of them and try to create a system that has as much anonymity as we can possibly build into the system.

You know, there is a vigorous debate going on about whether it is 100 percent anonymity or not. At some point, where there is hacking or a bad actor, or whatever, we are going to need to find some evidence that, for the safety of everybody else, can mute it out.
But I think what Walt was saying is that the data bits that are being transferred around are not necessarily personally-identifiable information or at least sensitive personally-identifiable information that would automatically create concern.

And we are looking for ways not to even match those bits to event or to require a decoder ring that only certain entities would have, would be able to do that tracing if in an extreme situation we needed to in terms of misbehavior detection and action with regard to misbehavior.

So, you are right, it is a massive challenge, but we are trying, as we go through this, to erect systems that minimize any possible intrusions on privacy, particularly with regard to any sensitive information. But we recognize the challenge, yes.

MEMBER KISSINGER: On this issue, regardless of whether this is justifiable, but, theoretically, couldn't the government take a minimalist approach toward regulation which would put them more in an enabling, as opposing to mandating -- I realize that some things would have to be mandated. But it isn't that theoretically a possible construct at some point?

MR. SMITH: Yes, it is possible. We could set standards for DSRC communications between vehicles without mandating its application. That is possible.

And then, the manufacturers would essentially opt-in as to whether or not they wanted to apply it to all or some of their vehicles, and so forth. It might not be the best way to retain the benefits all the time, but you are right, there are other regulatory models that we could use.

MR. BEUSE: No, no, I was going to say exactly that. I mean, we have those options, and I am certainly sure that the team will consider those as we get towards the finish line of the 2013 decision.

But I was going to underscore two things. One, I think, it speaks to the benefit about this
opt-in/opt-out. But I think on the privacy thing, I think there was a little bit talk in passage, though, that I feel what the regulation/statute is, but we do need to do a privacy analysis and we do have to look at sort of, if we go forward with V2V in a positive way and require it, we are required to sort of look at the impact of that on the privacy of citizens, right?

The other thing is it speaks to what we lose worry about, the false-positive thing and all that. It is consumer acceptance. The public will likely not accept, no matter how much you try to spin it, that it is okay for some entity out there to be doing X, Y, and Z if there has been no kind of discussion about X, Y, and Z is.

Certainly we will have a full discussion on the rulemaking. That would be on the table. So, at the very least -- at the very least -- we have got to understand exactly what would happen and what we are doing.

MEMBER WEBB: Well, I would submit that there is a very small vocal minority that will do that sort of knee-jerk reaction. But if most people knew how much personally-attributable information was given up just because you valued using this, even when it is announced that they understand what some network is doing, people are kind of like, "Oh, I didn't know that," but there is no groundswell reaction to it because they are not going to give up using this. Okay?

And my point isn't that you need to regulate. My point was that there has never been a regulation other than giving the industry some guidelines for self-regulation. So, when we talk policy, it is really that that doesn't exist in the U.S. other than for very, very unique areas like HIPAA, like other places.

So that you could actually avoid most of the issue by, rather than working on creating some policy regulation which would never occur, to spent the effort working on the policy, on the
self-regulation guidelines, which is what the government has always done.

MR. SMITH: For instance, the SCNS is --

MEMBER WEBB: Yes.

MR. SMITH: -- as we characterize it, one of the options would be that we would have
some kind of contractual relationship between NHTSA and the SCNS and would considerably, as
part of that contract, dictate that they very carefully handle whatever information could be traced to
an individual through different entities within that organization having different pieces of the
puzzle, and so on and so forth.

We could erect a situation that was guaranteed to maximize privacy and minimize misuse
of the information. We are trying to think through all that.

MEMBER ALBERT: I have a keen interest in the issue of market penetration and
day-one rollout. As you were mentioning those things, I was watching the tables, and everyone's
heads were kind of bobbing up and down.

(Laughter.)

In the area that I tend to represent, in rural America that has 80 percent of the road miles
and 60 percent of the fatalities, what is the thinking in terms of rollout, so that it is more national
and can be done? I mean, have some of the discussions taken place on that?

MR. SMITH: Well, first of all, the heads were probably bobbing because I was putting
people to sleep.

(Laughter.)

MEMBER ALBERT: No, it wasn't that at all.

MR. SMITH: Okay. Again, there is the infrastructure side, which I should let those who
know that side speak to it. But the vehicle side, we don't distinguish, or rural. Our standard, if we do one, would say that all manufacturers who sell vehicles in the United States, that as of "X" date or over a phased-in period, whatever it might be, thou shalt have the following DSRC equipment in your vehicles that --

MEMBER ALBERT: Doesn't that affect your benefits and costs if rural areas keep cars twice as long as urban areas?

MR. SMITH: Well, yes, but, I mean, our economists look at all of that stuff in terms of how long does it take to penetrate the fleet. They would look at it nationally, but they would know that you are talking about, which is how long folks keep vehicles. But since our standards would not apply regionally, we would be using a blended data to try to make those --

MR. BEUSE: And when we talk about day-one benefits, we are talking about day-one benefits that you can put on vehicles. So, maybe you could have mobile construction zones, or something like that, where that is a vehicle standard that could be deployed in rural America, and it doesn't necessarily mean V2I vehicle deployment. So, that is what we really mean.

But we are working. You know, it is a multi-modal thing. And Federal Highway I think has recently announced some actions that I think they are thinking with respect to it. Obviously, it depends on a positive NHTSA decision, but they have a roadmap as well.

MEMBER ALBERT: Dan or others, historically, is this something new? Or is it taking the same approach that you have taken in the past to rolling something out? Or is this really historically significant?

MR. SMITH: This is historically significant, to be sure, because even though our standards apply to all new vehicles, as you were saying before, if we can go this route, it would be
kind of putting or imprimatur on a whole technology and wave of the future that would,
presumably, last as far as the eye can see.

As I said before, it would be in the context of benefits occurring over time as penetration
develops, as opposed to every Ford, GM, and Toyota and other vehicle having that benefit the day it
drives off the showroom floor.

So, yes, it would be enormously historically significant. That is why we are putting the
energy into it that we are. That is why we are grappling with that whole series of issues. And that
is why, essentially, we drew a line in the sand for ourselves to say we have got to decide this now,
because there are so many hairy issues. We could kick this can down the road for another four
years if we waited for perfection. But we are trying to make a decision with the best information
we have.

CHAIR DENARO: Just a time check. We have got about 15 more minutes. So, I will
make sure other Committee members who haven't gotten their questions in yet can do that.

So, Joe, go ahead.

MEMBER CALABRESE: Yes, thanks.

I am here to represent the public transit industry. I compliment all the research being
done in cost/benefit and how to implement it, but, as I am sure you know, under MAP-21, they said
all rail will have positive train control by this date. And not a whole lot of research and probably
no cost/benefit analysis, but there is a date certain to find the money to build and deploy something;
no one knows really what to do.

How involved is the Department going to be? We know it is going to start with certain
railcars and then migrate the buses. So, we are talking now about retrofitting 30- to 40-year-old
railcars with some new, advanced system.

It was really precipitated by a very bad accident in D.C. and one in San Francisco, but in an industry that is extremely, extremely safe.

What oversight role or how is your research going to help, I think, the public transit industry to do this? Because, really, we don't know how to do this.

MR. SMITH: Yes, our friends from RITA will speak outside. We just deal with motor vehicle manufacturers. I know from my previous background in federal rail -- I have been doing positive train controls since 1978, and I know what Band-Aids are like to go have this technology without any funding. But that is kind of beyond our purview at this point.

The way that we would intersect with transit is that, when we get into heavy vehicles in our decision in 2014, if we were to require DSRC technology in heavy vehicles, that would include transit highway vehicles. But in terms of rail transit, we have absolutely no jurisdiction. And positive trains control is really kind of different from what we are dealing with here.

MEMBER CALABRESE: It is, but it isn't. It is still a V2V application.

MR. WINFREE: Right, but we do have transit vehicles involved in the safety pilot in Ann Arbor. So, we do have the buses that are circulating to the University of Michigan.

But, to Dan's point, we will be working closely with federal rail, particularly for the light rail applications. The heavy rail/freight rail, that is sort of not part of our program.

MEMBER CALABRESE: Our issue right now is there is a date certain to have something, and no one knows what that something is.

CHAIR DENARO: We will go to George, and then we will over to Raj. Okay, Raj first.

MEMBER RAJKUMAR: Yes, thanks.
I am not sure if this question is for Dan, Ken, or Bob. I would be interested in knowing whether we will get an update on the safety pilot that he has explained today and what role that study will play in the rulemaking process in terms of the content.

MR. SMITH: Well, Ken and company may want to talk about the update. I can tell you that the model deployment is going to play a significant role in our decisionmaking in two tranches, the first six months and the second, in terms of analyzing the data.

Already we know that the manufacturers are learning from what is being developed in the first few months, changing algorithms, dealing with certain things that have popped up in those first few months. But we are going to rely on it to some great degree in terms of our cost/benefit analysis.

MR. BEUSE: Yes, and in addition to the cost/benefits, it is also informing test-procedures-type work, so how you test these systems, because certainly the ones we are running in Ann Arbor met certain test conditions, and it is not a perfect prototype; we will make changes to those here. So, I think at this point both of those.

MEMBER RAJKUMAR: And is the safety pilot project on schedule in terms of a June/July outcome? And won't they do more analysis?

MR. BEUSE: Yes.

MR. SMITH: They are doing the analysis. I think the second six-month period ends actually in September in terms of data collection. Is that right, Ken?

MR. LEONARD: Yes, essentially, we are on schedule. We are actually ahead of production of data. We were a little behind schedule on equipage. Ninety percent of the vehicles were equipped fairly quickly, and then, there were the last -- I think we are at 97 percent. So, there
may be a dozen or two dozen vehicles that are still being equipped and put out.

But data-gathering has been going on essentially since August. So, over six months.
The first half of the data is analysis. There is a second half of the data that will be coming out.

But the safety pilot is proceeding. One of the issues we are looking at is, what do we do in August? It is scheduled to run through August. So, we are assessing that right now. We were not planning on providing briefing on the safety pilot, but we can check to see if Mike Schagrin is available to answer any specific questions you might have.

CHAIR DENARO: I apologize, Raj. We initially had talked about having an update from Mike Schagrin on the safety pilot, and omission, it didn't make it onto the agenda. But I agree with you, we would like to get that. So, maybe one of our phone conferences or something we will do that.

MEMBER RAJKUMAR: I would be interested, I guess, in the answer to one question. At the last meeting I think Mike or Walt gave us an update on the safety pilot, and the initial results indicated that there is about 1,000 vehicles around with DSRC radios. They are seeing a good amount of interaction already within the vehicles. I would like to hear confirmation, if you will, of that coverage.

MEMBER McCORMICK: Just as a clarity, of the 2800 vehicles, only 300 of them actually provide real data. The others are generating load on the network, so that they can determine whether or not it is processing.

And I am assuming that the 300 have all fully been equipped, and that the other 3 or 4 percent are waiting on -- are like the transit vehicles, I believe.

MR. LEONARD: Well, no, I think the transit vehicles are equipped. We have got
trucks equipped. I think there are a few -- Walt, do you want to -- a few of the aftermarket that --

MR. FEHR: I would jump in and clarify. All 3,000 of the vehicles are actively participating in the experiment. They are all transmitting valid, basic safety messages. So, they all contribute to the swarm intelligence that is, then, used by the 300 vehicles that are equipped with the ability to receive the messages. So, yes, they all are participating in the experiment and they all are transmitting valid basic safety messages. So, the 300 fully-equipped vehicles then drive through that cloud.

CHAIR DENARO: Thank you for bringing that up. We need to come back to that, I agree. So, at a future point, we will get them to --

MEMBER WEBB: Mine is going to be real quick. Three weeks ago, the National Association of Counties met here in Washington. County Commissioners came or whatever. We made a presentation on connected vehicles to the Transportation Committee. Three-quarters of the questions involved privacy as far as direct feedback from Commissioners, who for the most part represented counties of 50,000 population, or whatever, around the country.

There was also some real interesting questions related, "Oh, is connected vehicles that thing where they can drive the cars without having to drive them?" We said, "No, that is autonomous vehicles." "Oh, is connected vehicles one where the car is going to take over when you get those messages?" "No, that's not currently planned for."

So, while some interest, there is a lot of evolving in the discussion with the technology that the car companies are putting out and sort of blending this thing out there. So, when we get out and get that message out, it is going to be an interesting one, trying to narrow and be really narrow on the focus. So, it was just an information thing, the feedback that we got when I made the
presentation.

CHAIR DENARO: That is good feedback, and I think one of our Subcommittees is actually focusing on that. So, we will make sure we bring that into the recommendations.

But why don't we got with Bryan?

MEMBER SCHROMSKY: You mentioned in the latter part of your presentation V2I and I2V, right? So, understanding if you want to develop DSRC and you go to the manufacturers, right, that is a small community. Say, "Okay, put these standards. Here is a rule."

When you develop that technology and, to Peter's point, the standard, whatever it may be, and say, okay, this is what you do; this is what it looks like; put this in here. What ruling do you have to the other manufacturers that make a lot of different infrastructure, not a small-knit community, that they are already connected, you know, lighting, whatever it might be, stop signs, that is already connected by using another transmission to monitor that system.

But, then, to flip it around and then have that infrastructure talk to the connected vehicle, what oversight do you have to those manufacturers, suppliers? You know what I am getting at with that?

MR. BEUSE: The RITA folks could speak more to it than I, because part of the Federal Highway work is looking at that. And I think that was part of the announcement, about sort of using the funding that they use for guidance to the states, and that they could use, as part of that guidance of Federal Highway issues, that would apply to the DSRC interoperability with vehicle updates.

MR. LEONARD: So, we kind of refer to essentially three decisions, but the last one is not so much a decision. We have got the light vehicles in 2013, heavy vehicles in 2014, and
Federal Highway's guidance, deployment guidance, in 2015.

And so, that really is shaping up into essentially, if you are going to use federal resources to deploy ITS systems, here is what we would like them to be able to do. So, obviously, we want them to be able to hear the cars and to be able to communicate with the cars. My bridge is 11-feet 6-inches tall. The truck is 12-feet tall. Obviously, somebody has to make a decision, and it is not the bridge's decision.

(Laughter.)

So, we want to make sure that we get those standards and that information into guidance. So that, as states, localities, municipalities deploy ITS systems and put out the kind of equipment we would like to see them put out, traffic signals and whatever it is that they are going to equip, that there is uniformity and interoperability.

Now the requirement will simply be, if a state wants to locally fund and not adopt the national standard, I don't know that we have a recourse that would prevent them from doing that. And they can repair the bridge when the 12-foot-high truck hits it. But if they repair it using federal funds, they will repair it in the standard that comes out with the guidance in 2015.

MR. SMITH: So, if I could just supplement that, that is a great summary and everything, but assuming we proceed, assuming for sake of discussion that we proceed with a rule, and were to require some DSRC technology in a vehicle, we would want to assure that it would be V2I-, V2X-enabled. So that we would not be going from various generations where we have an early generation that could not speak to the infrastructure.

The other thing is, if any message from any source is being put into the vehicle in a way that affects safety, that is NHTSA's jurisdiction, even it doesn't come under --
MEMBER SCHROMSKY: Well, to that point, I mean, so the examples are saying, well, if I have a railcar, whatever it may be, and yet that out, right? But if I want to do something malicious with the infrastructure, I turn all the lights on green, and you are broadcasting that message and I am verifying, right? The cars or certs, whatever -- that is one of the discussions, right -- they are all live. They all say, "Yes, I have the right cert cue," and that is one of the debates. But if I turn the lights on green, I just mash everybody else out there, right?

So, we talked about V2V and how do we ensure security on the V2V stuff, but I would argue, does that same body that we developed that is really regulating that security model, you know, is it overlooking infrastructure as well, right? Because I could understand the V2V and verification, but if I am really -- my background work doing CT, counterintelligence, counterterrorism, if I hit the grid, I can do more damage that way, which might not have regulation under your authority, right?

MR. WINFREE: I think that is a consideration, but it is kind of somewhat independent from this program. We are certainly concerned about anyone messing with the infrastructure for scenarios like you pointed out. But, regardless of whether we have got V2V or not, lights all green are going to have the same consequence.

But perhaps if we think about it in the V2V context, the cars communicating, one of the intersection warnings that is given that somebody is blowing through a light. So, if you have the right-of-way, and now you have got a message that somebody is not stopping from the other direction, you know, perhaps that is a countermeasure.

CHAIR DENARO: Ron, did you have something?

MEMBER KIRBY: Yes, I just wanted to make a few comments from my perspective. I
am the Director of Metropolitan County Organization here in the Washington Region. I am the NPO representative to the group, just like Joe is the transit representative. Joe has got his automated train control issues, and I have got my NPO issues.

(Laughter.)

So, I thought I would bring a few of those, just from my perspective. This is only the second meeting I have attended of this group. So, I am relatively new. So, I thought I might give you a perspective from somebody new.

I have been in transportation for 30 years, but not in the intricacies of this particular topic. I initially found it a little hard to get my head around all of this because there is a tendency to dive into the technology. We are going to spend most of our day on spectrum discussions, which when you get into those, you tend to say, "Well, why are we talking about spectrum discussion? Let's back up a little bit and get the context of all of this."

Just as a few context comments that I think might be helpful, first of all, I would suggest it might be a good idea to have a list of acronyms in our folder. I know people have been tripping over their own acronyms here already.

And I turned to the first page, and the very first thing at the top of the page, I didn't understand, which was MTM context. What is MTM? I asked my neighbor here. She is a former Secretary of Transportation. She didn't know, either. So, I assume maybe I am not the only one.

We all struggle with this in our various fields. But I think just a list of these things would be real helpful because there are just a lot of them.

And then, you know, in terms of the big picture, I mean, what I do a lot is communicate
not vehicle-to-vehicle, but professional to the public, elected officials, members of the public, and try to explain a lot of planning concepts for them.

I was recently asked to come and testify before the District of Columbia Council on Autonomous Vehicles. One of the Council members was very excited about the idea of having a vehicle that would take her to work and that she could send home on its own.

And they put some language in their regulations to enable this kind of thing. And the press was there. Everyone was very excited about it. And I had to do a little bit of background thinking here as to, well, how does this relate to V2V, and so on and so forth.

I thought your presentation, Dan, was terrific. Not having a PowerPoint probably helped.

(Laughter.)

The only drawback is we don't have it written down except for our notes. But I thought it was very, very helpful for me.

The one thing, though, is that you ended up where I would have been inclined to begin, which was to talk about overarching issues like the fact that we are all aware of the fact that the OEMs are moving in the direction of putting all this equipment in individual vehicles. And there is a lot of press about autonomous vehicles, the Google car, and all of that.

It seems to me the question for V2V and V2I is, if all of this technology is coming on these vehicles, what is the increment of getting the vehicle-to-vehicle communication? We are going to get a lot of single vehicle. At least we will have that option.

I guess one question I had for the manufacturers is, does this tend to be only high-end vehicles or people at all levels of vehicles interested in buying this equipment?

MEMBER CAPP: I can address that some. I lead our technology area that is working
on these systems at GM.

The thing about the V2V is it is the one system that I think we have always viewed will go very broad. But it helps to decompose, and I like the way Dan put it, that V2V is not going to be the key enabler, or when we agree on V2V, it doesn't mean that, all right, the autonomous age has arrived, right?

I think it helps to just accept that those technologies are going to continue to evolve, just like computers evolve and they crash less and they get more features and stuff. Cars are going to do the same thing. We will eventually get to crash-less, too.

But we are taking baby steps right now. I mean, we are putting features in our cars, some of them, because people like them, some of them because they have some incremental safety benefit. Like Dan said, some of those are the ones that the agency will have an interest in, and some of them it is just not a priority for them.

Sight blind zone is an example of a feature that we have been putting on vehicles for some years. People love it. It helps them drive. The safety benefit is marginal. At least to date, the agency hasn't made that a priority one to get involved with. Everybody says it doesn't matter.

This technology, though, is required for us to ultimately get to this panacea of vehicles that do all these different things. We will have to have some level of connectivity to do it and sensors on the vehicles, and things we haven't even thought of yet. That will all have to happen.

But moving to V2V doesn't necessarily say you are in the autonomous age, either. It is a key input that is going to enable other things to happen. And so, hopefully, at the early stages it will have benefits from these information and warning-type features that people appreciate and it shows some safety benefit.
And we all know that eventually we are going to benefit from the spadework that has been
done here in 2013 or 2014, that 10 years from now we will start to be able to use it for other things,
too.

And we kind of have to look at it like that because we can't bite it off all at once. This is a
baby step that will be needed in the future, and it will have some benefit at the beginning.

And that is the reason, to Hans' point earlier about why isn't this adversarial, because we
all see this need. Personally, my company's view is the stars aren't going to sufficiently align
enough if the safety piece of it and NHTSA isn't the one that kind of drives this enabling first step.
Whether it is a rule, whether it is an NCAP, whether it is an enabler, there are a lot of ways to do
that.

But we have kind of concluded that, from a practical standpoint, there has been spinning
and spinning and spinning on this for 15 years. NHTSA is probably the one that is going to help
get it going. So, then, we can all have it in the future.

MEMBER KIRBY: Well, I am quite convinced of that. You made a very good case. I
think it is just the way it is being communicated that you might want to think about because the
perception out there is the vehicles are going to do this on their own, and there is a lot of hype about
that. I mean, I have seen a pretty good argument that truly autonomous vehicles are never going to
exist. I mean, it is just a fantasy. But that is not what you see in a lot of press and what the public
sees. So, that is kind of an issue.

And so, the issue here is that the increment we are talking about is the communication
between vehicles and between vehicles and the infrastructure, right? That is the increment over
and above what can be put on individual vehicles.
And the whole benefit/cost question relates to that. You know, it is the incremental benefit from the communication relative to the incremental cost of getting that in place and tackling all these complex issues that are only there if you try to communicate. They are not there if you are doing vehicle-by-vehicle, right?

And then, the dynamic here is that the benefits are slow in coming until you get the market penetration. So, you have got something that the costs are going to be upfront and the benefits are going to be way, way down the road. And that, to my mind, is a bit challenging.

I guess the one thought I had was, as this new equipment is being put into individual vehicles, if there was some way of building in the ability to communicate, even though it may not be used initially, but were kind of there as an add-on, not a very expensive add-on, I mean it seems like people like these gadgets.

Now I would love to have something that told me a construction zone is coming up, for example. That would be terrific. I mean, I think there would be a lot of value to that. That is a vehicle-to-infrastructure communication thing.

The vehicle-to-vehicle raises this whole host of additional issues, you know, security, privacy. It is a big leap, I think, that next step, which is why we are struggling with it so much.

But I think it is just a matter of how the thing is presented that would make it easier for people like me, coming into it for the first time. But, substantively, I really appreciate your presentation. I understand what you are doing, and I think it is right on track.

MR. SMITH: Thank you very much for your comments.

I will tell you, we struggle, too, even amongst ourselves, because of what I said, the various streams of innovation kind of coming at us. We are actually working on something that
we, hopefully, might someday publish, which will try to pull all of this together.

Because well beyond V2V, it is our responsibility to deal with the full range of automation as well, Google cars, and everything else. And so, how that fits together and how people understand it is very important to how it goes forward.

Thank you for your comments.

CHAIR DENARO: I want to respect everyone's need for a break here because we do have another session at 10:30. So, I would like to get on with that.

So, I want to thank Tim, Nat, and Dan for coming very much. This was extremely helpful, to hear directly from you, and so forth.

In case you didn't understand exactly what we said earlier, although our minimal requirement is to generate a recommendation memo at the end of this year, we want to generate, call it, an informal advice memo that is more directed at you guys, and maybe through JPO. And we have to go through them anyway.

But we want to weigh-in for you. You have heard already verbally. We are going to put this in words to some extent, and you will be able to see that. We want to cheer you on a little bit.

MR. SMITH: We appreciate the invitation and the hospitality and the good discussion.

And we didn't sink the canoe by sitting up here.

(Laughter.)

We are always available for discussion and consultation. We learn from others about different perspectives. That is how we do it.

CHAIR DENARO: All right. We are going to take a break.

(Applause.)
(Whereupon, the foregoing matter went off the record at 10:18 a.m. and went back on the
record at 10:36 a.m.)

PRESENTATION: SAFETY PILOT MODEL DEPLOYMENT UPDATE

CHAIR DENARO: All right. The next section is on the spectrum discussion. And just
to remind everyone, what we are considering is writing a memo as a Committee with our opinions
on what should be done about spectrum-sharing with regard to the V2V program.

And so, Walt is here to go through that in a little bit more detail. And while I am really
sensitive to what you said about diving into this, yes, I think it is going to be hard to keep Walt from
getting into technology -- but our interest is really the policy level of this.

Now, at the end of the day, when we hear all of this, do we agree that this
spectrum-sharing is going to be a workable solution or not? Or where are the vulnerabilities and
that sort of thing? So, it really comes back more into the policy as to why we are having this
discussion.

But, before we do that, just real quickly, and he promised me it is going to be a 90-second
update, because Raj had asked for it. And I apologize to the Committee; we took it off the agenda.
I didn't realize we did. But just a quick update on the safety pilot, so we hear that.

As I said, when there is more information about results from the safety pilot, we can dive
into more detail at some other point. But, for right now, Mike happened to be here. And so, he
offered to give us this update.

MR. LUCAS: I am Mike Lucas. I work for NHTSA on the ITS Program.

I am not officially in charge of the safety pilot, but I have the CAMP project that provides
the integrated vehicles and that data from those vehicles with independent evaluators.
So, the first phase -- we have two six-month phases, the drivers and the integrated
vehicles -- the first phase ended August 20th. And then, we had some vehicle rework period.
And so, this past weekend, we just reintroduced the vehicles to 63 new drivers. We lost a vehicle
in the first phase, not due to V2V.

(Laughter.)

So, the big change between phase 1 and phase 2 is that we are doing over-the-air security
credential management. So, the vehicles are requesting and receiving batches of certificates over
the air. We have 16 vehicles that are doing that, and then, the remainder of the vehicles are just
circulating five-minute certificates instead of one big certificates. They do some onboard
credential management as though it would be in a deployable situation.

Eight of the vehicles are doing 3G cellular requests for certificates and receiving
certificates from the Security Credential Management Entity in Oak Ridge and eight are doing it
through DSRC and the roadside equipment. And so, that is the big thing to watch during phase 2.

I guess the other important note is, with the first six months of data, we were seeing a lot
more interactions than expected. Actually, interactions were kind of on par, but the warnings were a
little higher than we predicted. But we are still trying to understand the quality of alerts. So,
VOLTE, the independent evaluator, as well as CAMP are doing separate analyses to understand
some of the false-positives and what the root causes were, and just what percentage were good
alerts and what percentage weren't. So, we hope to be able to report on that sometime in the
coming months, certainly by the 2013 decision.

I think that is it unless there are any questions in particular.

MEMBER SCHROMSKY: A technology question: the roadside DSRC sensors, what
is the backhaul from there?

MR. FEHR: It is a variety of mechanisms, depending on the individual installation. It goes anywhere from being a municipality's fiber network to 3 or 4G data mode, depending on the individual --

MEMBER SCHROMSKY: Okay.

MR. FEHR: The data exchange is immaterial. It is just IP anyway. So, it is kind of independent of whatever backhaul medium as long as there is a --

MEMBER McCORMICK: My understanding was that there was a test being run to determine the latency on both LT and 4G. Was that under the auspices of this program?

MR. FEHR: Latency under both LT and 4G?

MEMBER McCORMICK: Right, see what the latency of the message sets were if you used 4G.

MR. LUCAS: No, not in the CAMP work.

MEMBER McCORMICK: Okay. Thank you.

VICE CHAIR KLEIN: The outcome of the safety pilot will be crucial for NHTSA's coming decision, as I understand it. Are there some criteria that have been laid out in advance? Is there some measurement that will be applied, some criteria that will be applied in your program that NHTSA will use to inform its decision?

MR. LUCAS: So, our program is specifically for the NHTSA decision. The data helps shape the simulation tool that VOLTE is doing. Essentially, we are getting to effectiveness of the safety applications and that how plays into the cost/benefit equation.

MR. FEHR: There is no magic line or, I guess, no answer to the question. I don't think
we know enough to be able to say --

VICE CHAIR KLEIN: There is not an operational measure?

MR. FEHR: Well, there is an operational measure, but we don't know exactly where the needle should --

VICE CHAIR KLEIN: You know, I am not an official rulemaking person, but the Office of Management and Budget sets a value for dollars per life saved. And maybe Bob can speak towards that somewhat.

So, NHTSA rulemaking and leadership does have that type of value to look at, but they will consider much more than that when looking at a positive or negative decision.

MEMBER KENNER: Let me just make a comment. When we had some of the presentations in the past, there was a presentation that said something like, I think it was, 82 percent, you know, V2V can help in 82 percent.

And so, one of the suggestions I had was to scrutinize that number maybe with other safety data analysis experts to make sure we are aligned on what is that potential. And then, make sure -- because the number of applications in the safety pilot are less than that, right? -- that we have an understanding of, let's say for sure, the upper bound, right? We wouldn't expect it to be beyond whatever a certain number is. So that we have some context.

Because the concern I have is let's say there is a 50-percent improvement or something, and people compare that to the 82. They might incorrectly perceive that we way underperformed relative to what they had seen before, since that number has been in a whole bunch of presentations.

MR. LUCAS: So, your point is, with the applications, that number was in the seventies or sixties, and it is really 50 percent?
MEMBER KENNER: Well, first of all, I would want to make sure there is a total alignment on that number itself. And then, what is the number that would be appropriate, given the applications that are there, just to manage expectations. Because I am just a bit concerned that people might have a higher expectation than the reality of what is capable. Even if it goes absolute fantastic, I am just worried about the perception of some of the folks that are just sort of on the periphery and have only seen the overview presentation, for example.

MR. LUCAS: That is good information. Bob Kreeb and I -- I don't know if you know Bob Kreeb, but he can --

MR. KREEB: Hi. I am Bob Kreeb. I am kind of new to this program. I am the new Division Chief for the Intelligent Technologies Division at NHTSA.

Yes, I think that is a good point. You know, the idea that 80 percent of these crashes can be addressed by DSRC is true, but you are correct in I think pointing out that is something that could develop over time as we get more applications or that the applications we have get better and better. And so, I think it is a good piece of advice to sort of manage those expectations.

I should say, though, to your earlier question with regard to the safety pilot issue and how it informs this, that we fully anticipate that sort of the thresholds for safety benefits that would be necessary to result in a positive NHTSA decision are well, well, well short of meeting 80 percent of the crashes addressed.

MEMBER KENNER: Oh, yes. I am not as specifically concerned about the OMB process as I am about the perception of those that are on the periphery of this and not directly involved.

MR. KREEB: Yes, good point.
MR. LUCAS:  I know we have had meetings specifically with Mary and Kay from their organization, and even from other OEMs, to specifically talk about the benefit estimation process. Those are with both John and independent evaluators.

MEMBER KENNER:  Yes.  Great.

MEMBER KISSINGER:  You probably covered this in Ann Arbor, but I don't remember it.  The 300 people that are in that corps of 300 at this point, what kind of information were they given about the systems relevant to what motorists would get?

MR. LUCAS:  So, if I can speak to those that we are training for integrated vehicles, you saw that I gave a presentation of the driver clinics before the last meeting in Ann Arbor.  There was a training associated with that presentation and a film, a video, a training video that talks about the technology.

So, all the drivers went through that, but they also went through a mini-driver clinic.  So, they actually went out with the professional drivers that did the driver clinics and an instructor that talked about the scenarios under which they would get warnings and demonstrated that versus the other vehicles.

CHAIR DENARO:  Mike, thank you very much.

MR. LUCAS:  You are welcome.

CHAIR DENARO:  We appreciate the update.

And we will get on with our spectrum discussion.  But before we do that, I have a much, much more urgent matter.  That is that one of you so far, to use the term we have been using, as opted out of lunch.  You haven't turned in your menu request.  So, whoever you are, I strongly advise, if that is not your intent, you correct that.
Stephen, do you have all the menus now?

MR. GLASSCOCK: No.

CHAIR DENARO: Oh, you got it. All right. We are good.

MR. FEHR: Well, we are not exactly good because this thing decided to go south on us.

MEMBER McCORMICK: Your deck is in here, though, right?

MR. FEHR: Yes.

MEMBER McCORMICK: Yes, your deck is in here. Do you want it? Do you want a copy?

(Laughter.)

MR. FEHR: No, actually, it is a PowerPoint.

MEMBER McCORMICK: Oh, okay.

MR. FEHR: Yes, sorry about that. You can never depend on this technology stuff.

SPECTRUM PRESENTATION AND DISCUSSION

CHAIR DENARO: Walt, this end of the canoe is far away. So, you need to keep it up.

MR. FEHR: Right. I will step forward a little bit.

Before I get into my particular portion of the presentation, I wanted to introduce my colleague Tim Klein, who is sitting in the wing here. We have kind of divided this topic up into two separate areas because of our interests and abilities.

I am going to be giving you some technical background on this particular topic. And then, Tim is going to cover how the Department is dealing with this particular issue and how that may be unique to what others outside of the Department can do in this particular case. Because
there are very clear rules of how we have to interact with various other government agencies in this particular area, and he is the expert on that, and he wanted to answer questions in that particular area.

Technical Background

I understand the technology to a pretty good level here. What I wanted to do here was spend most of my time filling in what might be missing information, because people need to have a complete understanding of what is going on around us here in order to fully appreciate how it might affect our ability to use the 5.9-gigahertz spectrum allocation for the purposes that we intend.

You flip to the first slide. That particular slide gives a very quick overview of what is the thing behind this Notice for Proposed Rulemaking that the FCC released late last year. Yes, that particular chart right there.

And it wasn't until we saw that actual Notice for Proposed Rulemaking from the FCC that we fully appreciated what was going on. It wasn't just a spectrum grab, trying to get the 5.9-gigahertz DSRC allocation. It was actually a much, much bigger plan that the wireless industry had been working on for a while in order to come up with what is considered the next generation of wireless communication for IT purposes. Generally, people consider it the wifi, and the next generation of wifi.

There has been quite a bit of work going on in the background for coming up with the newest version of wifi that is referred to as 802.11ac. And then, there was a need to come up with an area of spectrum that fully utilized the capability of that new service definition.

And so, people had come together and identified that the 5-gigahertz band within all of the possible bands that were out there would be the best suited for this particular type of technology and
started to pull together an overall plan that would unify the vast majority of the entire 5-gigahertz
band in order to allow a space for the full capability of this new version of wifi to be exercised.

So, this Notice for Proposed Rulemaking covers all the way down to 5.150, all the way up
to 5.925 gigahertz or megahertz. And it is the entire 5-gigahertz band, essentially.

And what people have in mind is that they would unify the rules of operation throughout
this entire stretch of spectrum, so that the capability of this new wifi medium could be much more
completely deployed.

You can see that over the course of time several different allocations have been made in
the 5-gigahertz band that are identified as U-NII-1, -2, and -3 at different points in the history.
They were done in a time when wifi was much simpler and people could deploy it in any one of
those particular areas as the case dictated. But there were different rules, depending on where it
was and the other primary users of those allocations. So, 5-gigahertz wifi had never been really
very popular. There never was very much of it deployed.

This new generation of wifi, though, with its increased capability, needed a much bigger
spectrum area to work in. So, the whole purpose of this Notice of Proposed Rulemaking is to
much more well-unify all of the rules that apply to all of the different sections of spectrum in that
entire stretch of 5 gigahertz, so that it would be easier for the device-makers and device-users to
exploit the capability of this new version of wifi.

So, they have filled in the gaps. They are leveling some of the other rules and some of the
other spectrum allocations, and they touch this spectrum allocation up at the top end of the band
that had been originally allocated for our particular use. So, that is how we got pulled into this
overall thing, is that it was one portion of this overall plan to create this very large area of spectrum
that would allow device-makers and device-users to more fully utilize the capability of this new version of wifi.

So, it wasn't something that was just directed at that little bit of spectrum up at the top. They are trying in this particular rulemaking to much more unify the operation of wifi devices up and down the entire 5-gigahertz band.

So, that is something that everybody needs to appreciate.

MEMBER STEENMAN: And DSRC is all the way at the top? Where does it sit?

MR. FEHR: It goes from 5.850 to 5.925.

MEMBER STEENMAN: Okay. That little blue space there?

MR. FEHR: That little blue space up at the top.

MEMBER STEENMAN: Okay.

MR. FEHR: What people are starting to refer to as the proposed U-NII-4. That is the one little piece where the interests of this room overlap. It is only that one little piece up at the top. I say "little piece," but when you look at the bigger plan, it actually is only a small piece of the overall plan.

So, of the 100-and-some questions in that Notice of Proposed Rulemaking, only about six or eight of the questions actually are related to that one piece of spectrum. The rest of the questions are related to all of the other areas within that 5-gigahertz band, and the other users in that particular existing spectrum down below ours.

So, there is a whole smorgasbord of other users out there who are preparing replies to this because their interests are affected, just as our interests are affected by this potential reshaping of the 5-gigahertz band. So, it is a very, very large effort that is going on out there that covers a whole
host of other users besides us. So, only a few of the questions in that Notice of Proposed
Rulemaking were actually directed at this particular spectrum allocation.
So, that is one of the pieces of information I wanted to make sure everybody was aware of,
is the large plan that this particular activity fits within.
Just as a little bit of background, when you look at what the U-NII device-makers are
trying to do, you can fully appreciate the scale of what they are attempting. This new generation of
wifi gives the ability to use much larger-capacity channels. They define 80- and even
160-megahertz channels that give several hundred percent speed increases for particular
applications.
People are talking about the ability to now stream uncompressed, high-definition video
over the air. So, it can eliminate Cat 6 cable or high-definition video cable for that last 10 feet of
an installation. That is one of the new capabilities of this new media.
They are using denser modulation schemes that give another level of speed increase
capability. They are doing more multi-input/multi-output in this new particular definition.
The aggregate of all of what they are doing people are characterizing as something that
may give wifi a thousand times more capacity. It is just completely incredible what they would be
able to do with short-range wireless connections for IT purposes if they were able to fully exploit
the capabilities of this new wifi definition.
So, there is an extremely large amount of interest in that from the people who are
advocating this complete plan for spectrum utilization. It is a very significant interest out there that
is involved here.
That is another thing that people need to keep in the back of their mind, is that it is a very,
very large interest group out there that would like to be able to do this, simply because of the huge
monetary benefit that could be gained if it were able to be done.

Just to make sure everybody is grounded a little bit on what we plan to do with the 75
megahertz that are originally allocated for DSRC purposes -- this is the spectrum from 5.850 up to
5.925 -- we have defined a scheme of seven 10-megahertz channels that exist within there.

We use particular channels for particular purposes. There are two main types of
communication that take place in the DSRC world. One of them is this broadcast mode sharing of
information that is so critical for our crash-avoidance types of applications and other applications
that require urgent distribution, urgent sharing of information.

And so, particular channels have been dedicated to that particular purpose; namely,
Channel 172 and possibly Channel 184 are dedicated to this broadcast mode, urgent sharing of
information type of communication.

The rest of the channels are used for establishing the ability to do peer-to-peer type of
IP-based data exchanges. We mentioned that we were using DSRC to distribute security credential
material in our model deployment. Well, we are making use of that mechanism to set up the
ability for the roadside equipment to act as a gateway device, so that there can be an effective IP
data exchange between a moving vehicle and fixed infrastructure.

That is one of the biggest reasons for our continued high level of interest in this particular
communication medium, is that it has been so well-engineered to work in a moving vehicle
environment. There is no other short-range wireless communication packet base that is out there
today that works as well when the various elements of it are moving at vehicle speeds.

Most people don't appreciate the physics behind that kind of a situation, but you have to
very much tailor the implementation choices of a communication medium when two vehicles are
closing at each other at 70 miles an hour, and you are attempting to do packet-based
communication, or you are operating these vehicles in high, multi-path environments like you
would see out on the street right outside of this hotel we are in.

So, we are very much interested in being able to accomplish these broadcast mode
communications for the urgent data exchanges needed for safety crash-avoidance types of
applications and the ability to do packet-based IP data exchanges between moving vehicles and
fixed points for other types of purposes.

And again, we have mapped out these seven 10-megahertz channels. They have been
tailored very much to work well in that moving vehicle, high multi-path environment that we have
out there in the transportation world.

MEMBER STEENMAN: What you are saying is tied to a frequency band? That this
frequency band lends itself well to those types of applications?

MR. FEHR: It is the other choices of how the modulation schemes and the bit rates
and --

MEMBER STEENMAN: Okay.

MR. FEHR: -- several other of the design choices that you have with --

MEMBER STEENMAN: But like this wouldn't work as well at the 6-gigahertz band?

MR. FEHR: No.

MEMBER STEENMAN: Or at the 3-gigahertz band?

MR. FEHR: It may not be quite the same down at 3 gigahertz, but 6 gigahertz it probably
would be. They are probably close enough.
MEMBER STEENMAN: Okay.

MR. FEHR: There is nothing really magic about 5 gigahertz for that.

MEMBER STEENMAN: Okay. I understand now.

MR. FEHR: As long as you are close, you could probably do the same kind of radio service, you know, just above or just below it, but probably not in 3 gigahertz or 2 gigahertz.

MEMBER STEENMAN: Yes.

MR. FEHR: Anyway, again, we have been working on this particular band plan and utilization of those particular channels for some time now and have come up with schemes that, again, work very well in this moving vehicle context.

And I think the people that are looking at the entire portfolio of wireless communications that are available for modern vehicles these days appreciate that having this one particular communication medium with its capability to work well in that class of operating situations is a very useful component in the grand scheme of wireless communication media that are available. And so, there is a lot of interest out there in preserving our access to this communication medium, particularly for safety types of applications and for other types of applications, again, in the moving vehicle context.

So, some of the questions that we are off trying to answer right now from a technical perspective, we have been asked to consider whether or not this particular spectrum allocation could be shared. So, the fundamental things you have to know are whether or not these two radio services could detect each other, because both radio services, as we know them, wifi and DSRC, are all members of the 802.11 family of packet-based radio communication protocols, and they both rely on this carrier-sensed, multi-access collision-avoidance scheme in order to assure that only one
device is transmitting at a time. You know, it is kind of a polite conversation model of radio
operation where you listen to see if the medium is available before you transmit.

So, one of the fundamental questions that has to be answered, if they things were to
coexist, is, can they actually hear each other? Can they actually intelligently detect that the two
transmitters are out there operating, so that they can use this carrier-sense, multi-access scheme to
avoid transmitting over each other? And that affects both types of radio services. Only one
transmitter can operate at a time to effectively not interfere with each other. So, you have to be
able to detect each other before you could do this.

And so, that is one of the technical questions that we are trying to assess right now, is, can
the two radio services actually detect each other, so that this collision-avoidance scheme could
actually work?

And then, the other question, once you have detected that there are two transmitters out
there, can they tell what type of a transmitter they are? Can an 802.11ac device tell that the other
transmitter is an 802.11p device?

That is fundamentally important because the 802.11p devices would be the primary user of
the spectrum. They would be the licensed user of the spectrum. As an unlicensed user, the
802.11ac device is supposed to defer to the licensed user. It is not supposed to interfere with the
operation of the licensed user.

So, that is the other question that we are trying to find out as we assess this situation, is
whether or not an 802.11ac device can tell that the other device that is just detected is an 802.11p
device, a DSRC device? So that it can properly defer the use of the channel to the licensed user.

MEMBER STEENMAN: Is there a right-of-way for the licensed users? Like so that the
licensed users always has priority?

MR. FEHR:  I will take a stab at this.

MR. KLEIN:  Go for it.

MR. FEHR:  Okay.  Yes, it was actually Commissioner McDowell who made the clearest statement on that.  It is related to the unlicensed user shall cause no harmful interference with a licensed user.  We have no definition of "harmful interference".

(Laughter.)

So, that will drive how the FCC sets the rules on spectrum.  So, that is up to the technical community to figure out whether or not the two radio services have those kinds of capabilities, the fundamentals needed for any kind of a sharing to be considered.  Can one detect the other, so that they can properly operate their collision-avoidance strategy?  And then, can one determine that it is coexisting with the other type, so that the secondary user can properly defer to the primary user?

And the ability to do that and the ability to manage that kind of a situation will ultimately decide whether or not anything could be considered.

Yes, ma'am?

MEMBER HAMMOND:  Can you give an example of a licensed primary user and an unlicensed user?  I don't understand the difference.

MEMBERMcCORMICK:  Patriot missiles.

MEMBER HAMMOND:  Hum?

MEMBER McCORMICK:  Patriot missiles are licensed on this spectrum.

MEMBER HAMMOND:  Oh.

MEMBER McCORMICK:  They are just not near roads.
MEMBER HAMMOND:  Oh, interesting.  Is that right?

MR. FEHR:  Well, DSRC devices installed in automobiles are on the side of the road --

MEMBER HAMMOND:  Right.

MR. FEHR:  -- for communication purposes.  They wouldn't actually be licensed devices.

MEMBER HAMMOND:  Okay.

MR. FEHR:  You would have to obtain the proper license from the FCC in order to operate that equipment.

MEMBER HAMMOND:  What is unlicensed?

MR. FEHR:  Pardon?

MEMBER HAMMOND:  What is unlicensed?

MR. FEHR:  Okay.  In this particular context, the unlicensed devices are the consumer-grade or the --

MEMBER McCORMICK:  It could be this.

MR. FEHR:  -- like wifi gateway devices is --

MEMBER McCORMICK:  If you are using a phone on wifi, it is an unlicensed, but the phone itself is licensed.

MEMBER HAMMOND:  It is an 802. --

MR. FEHR:  Yes.

MR. KLEIN:  That is a, b, g, and ac.

MEMBER STEENMAN:  How about the determination?  I had always assumed that DSRC is deterministic.
MR. FEHR: Yes, deterministic --

MEMBER STEENMAN: In that there is a minimum delay, right? Otherwise, I mean, if everybody interferes, then you would never get over to the medium, then we could take five minutes before you finally get your message out?

MEMBER McCORMICK: Right. There is a minimum delay for the handshaker curves, yes.

MR. FEHR: Well, there is a minimum amount of time, particularly when you are sharing urgent information, like vehicle situation information is part of one of those crash-avoidance applications. If it takes too long to share the information, it is no longer useful because it is stale. The vehicle has moved or it has changed its speed or it has changed its direction.

So, there is a certain expectation that information be shared as close to instantaneously as possible. We are finetuning that closely, as instantaneous as possible.

And that is one of the reasons why our critical safety applications are actually organized in a very, very low level of intelligence. This swarm-intelligence kind of philosophy is simply because that is the most efficient and the most expedient way to share information among a large number of entities because you can use broadcast modes or do it simultaneously. It is extremely efficient and extremely expedient.

And anything that would cause the actors that are expecting that kind of behavior a delay in being able to transmit their information would make it that much less useful. It becomes stale after a while.

MEMBER STEENMAN: So, is your concern that the wifi keys hog the channel?

MR. FEHR: Yes, that is probably the most elegant way to put it.
(Laughter.)

Because of the large frame sizes and the other things that you may have with this new radio service definition, if one of them should actually start transmitting, it may be a while before anybody else could get anything in edgewise.

VICE CHAIR KLEIN: So, if the technology works as designed, there is not a problem. If carrier-sense works, if collision-avoidance works, then the DSRC will always get the priority? It is designed to get the bandwidth it needs.

The points you are raising are, hey, will this protocol actually work in practice? Because it might not work in practice, in which case we are in trouble. But, as designed, the DSRC knocks out television, pushes aside television, and gets what it wants?

MEMBER STEENMAN: Who is chartered to test that? Is that an industry test or --

MR. LEONARD: Well, I am not a technical expert, but --

MR. FEHR: Yes, I could say, from a technical perspective, you could probably with well-disciplined engineering come up with a system that would give you probably three nines expectation that that would work, but that is the well-disciplined engineering answer to that question.

What you just alluded to in your statement was that we are dealing with consumer devices, and we are dealing with an extremely large quantity of them. That kind of a situation tends to have all sorts of different actors involved in it. And so, it becomes not an issue of coming up with an engineering solution to a problem like that; it comes up to how well you can actually manage the engineering solution.

MR. LEONARD: You started this by saying this is the model point communication.
Now imagine you are on the Senate Floor and someone has decided to filibuster. It is going to be 13 hours before you get your message out and the safety-critical application. TV could filibuster the DSRC message because of this collision sense.

What we really need is for DSRC to be able to initiate the impolite conversation. "I'm sorry, you have to be quiet, TV. I need to tell this car it is about to hit something."

(Laughter.)

And so, what we really need is a priority message to be able to interrupt the lower-priority message. Now that is an engineering solution that is different from the protocol that Walt described.

Did I say that technically correctly?

MR. FEHR: Well, it is one of the aspects of the polite conversation that would have to be engineered in. We don't know if that capability is there right now or not. That is why we are investigating it. That is why we are attempting to learn as much as we can about the 802.11ac specification and, more importantly, how it is actually implemented in these various devices.

Because there are a lot of choices like that that could be made. Policies or practices could be put in place to cause them to have to listen much more often or not allow the jumble of frames that people are talking about on those particular channels or a lot of other of those kinds of design choices or implementation choices would have to be thoroughly vetted and decided. So that there wouldn't be any of this latency.

We don't know what the 802.11ac device-makers have in mind. So, that is part of what we are trying to find out.

And again, even though you can come up with an engineering solution that would give
you three nines or even five nines assurance that it would work, how do you actually control that
when you have literally millions of those devices out there coming from who knows where,
operated and installed by unknown parties? How do you assure that every one of those continues
to operate or actually does operate the way you have engineered it?

So, that is the other thing that people need to think about. It is that, even if we could
come up with the perfect solution, managing it in the field is probably the bigger concern than
coming up with that solution.

VICE CHAIR KLEIN: And our preferred solution would be, when the vehicle isn't using
that bandwidth, but it sits unused, and then it is there. So, that is perhaps less efficient, but it is
more safe. It is safer for them to know that --

MR. FEHR: That would be the easiest decision, that they just don't use it.

VICE CHAIR KLEIN: Yes.

CHAIR DENARO: Well, when you say "managing it in the field," you are not talking
only about unlicensed devices? You are talking also about licensed devices? Is that right?

MR. FEHR: Well, you know --

CHAIR DENARO: It is still a challenge?

MR. FEHR: Obviously, the licensed devices have to play by the rules, too.

CHAIR DENARO: Right. But is that still a three nine vulnerability? There could be
some problems? Or are we referring mostly to unlicensed at this point.

MR. FEHR: Well, I was referring to the unlicensed ones.

CHAIR DENARO: Okay.

MR. FEHR: Because I can't really say anything about the licensed ones.
CHAIR DENARO: Yes.

MR. FEHR: I would have to defer to the guys who are sitting right behind you there. They are the ones that will have a stake in that particular --

CHAIR DENARO: Okay. I just wanted to clarify that. These are not licensed?

MR. FEHR: Yes, the unlicensed.

MEMBER HAMMOND: So, about a year or so ago, we were worried that the FCC was not going to keep room or preserve room for the DSRC. Is this whole conversation aiming towards the fact that it has been recognized and they are making room in the bandwidth for this?

MR. FEHR: No.

MEMBER HAMMOND: I am confused by the conversation.

MR. FEHR: It is actually the opposite.

MEMBER HAMMOND: Oh, okay.

MR. FEHR: They continue to recognize that DSRC has this particular allocation. There is no quibbling on that.

MEMBER HAMMOND: Okay.

MR. FEHR: What they are attempting to do is to allow other users --

MEMBER HAMMOND: Into that bandwidth?

MR. FEHR: -- into it.

MEMBER HAMMOND: And so, you are working on trying to define what that could look like or how it could work?

MEMBER RAJKUMAR: If I could stand up on a soapbox --

MEMBER HAMMOND: Right. Yes.
MEMBER RAJKUMAR: -- my understanding of the situation is the following: the DSRC band, the last blue box out there, that was allocated for dedicated use by DSRC. The DSRC is dedicated.

MEMBER HAMMOND: Right.

MEMBER RAJKUMAR: It has been out for about 10 years now.

MEMBER HAMMOND: Yes.

MEMBER RAJKUMAR: And then, since V2V/V2I is not being mandated, it is not adding any cost out there. So, the band has gone unused.

MEMBER HAMMOND: Right.

MEMBER RAJKUMAR: And meanwhile, wifi are using the unlicensed band, if you will. As everybody knows, everybody uses wifi on your phones, your laptops, and whatnot. So, it has become very popular very quickly.

And meanwhile, the wifi industry, if you will, Cisco and all the other device vendors are saying, "We would like to have more bandwidth so we can actually build faster devices, give you maybe up to 1,000 times more bandwidth, up to a gigabit per second on wifi. We can make more devices. We can sale more devices. And meanwhile, it is a large benefit for the end-users. We can replace cables, higher bandwidth, watch video.

So, it is basically the wifi industry came in after DSRC was allocated. It has become very popular. Everybody loves it. They want to actually create a bigger market, more benefit to the customers.

And they see this blue box out there and say it is not being used currently, and they have been trying to essentially take it over. And my understanding is that the --
MEMBER BERG: Not take it away; reuse.

MEMBER RAJKUMAR: Oh, reuse, okay. So, that is the discussion that is going on.

And now, the question is whether we continue to have dedicated use of that band or they get complete usage of the band as it goes away. And hopefully, the compromise would be that you would be coexisting.

MEMBER HAMMOND: I see.

MEMBER RAJKUMAR: So, that is the question being discussed.

MEMBER HAMMOND: I get it.

MEMBER RAJKUMAR: And going back to Bob's question, given unlicensed devices, how to follow whatever the specification is for them to be, I guess, compatible with the FCC regulations.

MEMBER HAMMOND: Got you.

MEMBER RAJKUMAR: So, what I think he is trying to say is that, if we make DSRC be the licensed device, and they get priority over 802.11ac, in this case they remain silent when V2V is active, when V2I is active.

MR. FEHR: Yes, that is the simple thing. There has to be an effective mechanism that the communication abilities that we want to have will not be interfered with by the unlicensed --

MEMBER HAMMOND: Right. Okay. Thank you.

MEMBER KISSINGER: So, is this resolvable?

(Laughter.)

Or does this mean we are going to be entering this "Brave New World" and we don't really know what is going to happen?
MEMBER McCORMICK: Well, I guess my question would be, is there someone chartered to determine whether or not they can play well together? Or is that just left up to industry to figure it out?

MR. FEHR: Well, the official way I understand it -- and Tim will probably touch on this -- the NTIA, the National Telecommunications and Information Administration, will be charged with doing the analysis of this potential sharing.

MEMBER McCORMICK: Okay.

MR. FEHR: We independently are doing some things to satisfy ourselves as well. And I am sure that others are doing other things independently. But the official evaluation is supposed to come from the NTIA, who will then give the results of that analysis to the FCC for consideration.

CHAIR DENARO: In spite of everyone else, we have Charles Glass from NTIA after the lunch break.

MEMBER HAMMOND: Oh, good.

MEMBER STEENMAN: So, you mentioned earlier that there are other people in these other bands that are kind of taking over, well, co-opting. Do they have similar concerns?

MEMBER SCHROMSKY: Oh, yes.

MEMBER STEENMAN: Are they doing tests there, too?

MEMBER SCHROMSKY: We have concerns.

(Laughter.)

MEMBER STEENMAN: You have concerns?

MEMBER SCHROMSKY: One of the last big options was the public safety. It wasn't under that band, but there are other concerns. When you decommission the analog television
stations, that went back out, and then some of that spectrum went to public safety.

MR. FEHR: There is a number of military and civilian uses of those other areas of spectrum that have similar concerns to us. They are trying, again, to unify the rules of use of this entire stretch of spectrum to make it easier for them to build these high-capacity devices. So, they are touching all sorts of other old issues, trying to freshen up the rules in those other areas, and they are getting all sorts of the same kind of interaction that those other factions are --

MEMBER STEENMAN: So, they promised this 1000X improvement. If they get less allocation, does it go down a lot? A little bit?

MEMBER RAJKUMAR: What if the blue doesn't exist? What happens to 802.11ac?

MEMBER STEENMAN: It is like 800 times as efficient or --

MR. FEHR: We would have to ask the wifi, the U-NII device-makers because I am not sure exactly what their calculus is, how critical any one of these pieces is. That is something that they would have to provide.

MEMBER RAJKUMAR: But if we can add some more context, my understanding is that, even within industry, there is at least a conflict at some level. For example, a big segment of Cisco, for example, says that "We need the whole band. We can sell a lot more wifi devices." And there is another small segment of the Cisco office that says, "We need the DSRC." I mean, that is a market segment they are marketing.

So, even within companies, there are conflicts, but the wife segment is much larger than the DSRC segment, as it stands today, right? And then, so the highest levels, my understanding is that FCC has been pushing for bigger wifi, which means all the spectrum, at the highest levels of the FCC.
MEMBER STEENMAN: That is clear. But today the consumer benefit is much, much larger.

MEMBER RAJKUMAR: Yes. Yes, for wifi.

MEMBER STEENMAN: Right.

MEMBER SCHROMSKY: But the challenges on the constraints, in the cellular realm that is why you will see a multi-band device. So, for instance, we run 850, 1900, and 700 megahertz, just because we have a finite resource. So, you have to work with what you get. And so, that is why you have the same thing for AT&T or other carriers; you will see multi-band devices, just because it would be nice to have everything in one block, but it is not available.

MEMBER RAJKUMAR: So, this issue could end up being the biggest threat to DSRC regular --

MEMBER HAMMOND: And what is the timing of the analysis that is going on right now on compatibility?

MR. FEHR: I think that is a good segue. We need to switch here because Tim is much more familiar with the mechanisms --

MEMBER STEENMAN: There may be one other question, really a question. Could we just move to a different space? Or is that like really hard?

MR. FEHR: It would be a matter of going through that work of figuring out -- there is no open spectrum anywhere.

MEMBER SCHROMSKY: You are kicking somebody else off.

MR. FEHR: That would be the challenge. If we were to go immediately above there, you are now into satellite uplink territory.
MEMBER McCORMICK: And the other thing is that, globally, it is all within a very short bandwidth left or right of the space, anyway. And so, if you are a manufacturer, you don't want to be building products for different regions, if that is at all possible.

MR. FEHR: Yes. Then, you get that whole problem if you are over in Asia.

MEMBER KIRBY: Has this issue been dealt with in other countries? I mean, is this ultimately something global, right?

MR. FEHR: Yes.

MEMBER STEENMAN: And they are all independently making these decisions?

MR. LEONARD: Well, Europe and Japan are both in this same spectrum of space. I think the Japanese are --

MR. FEHR: They are 5.8 and we are 5.9.

MR. LEONARD: -- 5.8 and a little bit below. Europe I think is in 5.9.

So, if we made this change in the U.S., it has global ramifications because OEMs are global entities. They want to get economies of scale.

MEMBER KIRBY: Could they make changes with implications for us?

MR. FEHR: Absolutely.

MR. LEONARD: Yes.

MR. KLEIN: Let me jump in on that. What we know -- this is not part of my presentation. I was told to focus on what this group is working on.

(Laughter.)

But, since you have asked the question, a similar proposal has been introduced to the European Radio Commission. It is going to be introduced in Japan very shortly. And it is
questionable, but there is an attempt to put it on the World Radio Congress agenda for 2015, which is the ultimate grail for this, is if they can get U.S. and Europe with U.S. and Japan -- I say "they"; we, because we are part of this. We have a definite interest in broadband.

If someone gets one of the major players to move before then, then it could become a new worldwide standard, and that is the end-game.

MEMBER STEENMAN: And by that, you mean the spectrum --

MR. KLEIN: This 5 to 6, all for wifi, everyone moved out of it. That is pushing -- that is moving in all kinds; that is moving in every telecommunications regulatory body in the world.

MR. FEHR: Yes, it is important to understand that this is not just a U.S.-only activity.

People are working on this all over.

CHAIR DENARO: Well, before you leave us or sit down -- one more type of a question. I think what we are talking about is mostly a data-collision problem. Is there also just a frequency problem, in that you have got a device out there that is just blasting a ton of power; it gets swamped out receiving a message from a vehicle?

MR. FEHR: Yes. And just to make sure everybody is aware, there are other binary users in that spectrum allocation already. There are certain military radars which tend to be small in number and small in footprint that are also primary users, and there are certain satellite uplinks that are also primary users. But they tend to be small in footprint and not very mobilized.

If you look at the grand sweep of the United States, you could expect that kind of interference, that kind of swamping-out, in an extremely small portion of the continental United States, and they tend to be very localized. So, there will be these little spots on the map where DSRC won't work because other primary users happen to have a satellite uplink there or a radar
installation there.

    CHAIR DENARO:  But I was also thinking of your unlicensed operator.  If they are
    trying to get a little more range out of this sucker, you know, they could power up really strong.

    MR. FEHR:  Well, that all goes back in being able to manage the unlicensed devices once
    they are out there.

    CHAIR DENARO:  Right.

    MR. FEHR:  Because we all know that with previous generations of wifi gateway
    devices, you know, your wifi router, there are these websites that you can go to out there and you
    can get hot firmware updates and you can cook those things any way you want.

    It is a matter of coming up with a way of managing those devices once they are out there.
    Because they leave the manufacturer's hands, all sorts of things could happen repurposing.

    CHAIR DENARO:  Good point.  Good point.

    MEMBER BERG:  That can happen to even licensed.

    MR. FEHR:  It is a huge challenge.

    I'm sorry?

    MEMBER BERG:  That can happen to even licensed.

    MR. FEHR:  Oh, of course it does, yes.  Yes.  Properly-built devices, once they leave
    the manufacturer's hands, could be --

    MEMBER RAJKUMAR:  But suppose that device does stick with the maximum public
    limitations of the unlicensed device.  What is the range that we can expect, the maximum range?

    MEMBER STEENMAN:  Three hundred meters.

    MEMBER RAJKUMAR:  For ac?
MR. FEHR: They typically want it to be much shorter than that. I don't know a particular number, but it is probably on the order of 10 meters.

MEMBER RAJKUMAR: Yes, that is what I think. Basically, it means that for DSRC basically about 15 meters around the roads. In the country, you should not be using wifi.

MEMBER McCORMICK: Well, but you could have it on your passenger's person in your car.

MR. FEHR: Yes, that is the tricky bit because this is what is actually going to get 5 gigahertz silicon into the vehicles. They are going to create these 802.11ac hotspots inside of cars.

MEMBER RAJKUMAR: Yes. For us to coexist, that is like DSRC with the radar.

MR. FEHR: Yes.

MEMBER RAJKUMAR: So, that is the trick. We should probably get that process going.

U.S. DOT Policy Issues

CHAIR DENARO: Okay, Tim, we had better let you get up.

VICE CHAIR KLEIN: And please yell. If you ask me, I don't think anybody can hear back here.

MR. KLEIN: Okay. Thank you.

My name is Tim Klein. I have had the privilege of meeting with some of you all in various other contexts in my job.

I wanted to point out my boss, Jane Mellow, who is the head of RITA's Governmental, International, and Public Affairs Office, with whom I work, and also Thomas Bolle, who is from our office.
This is a narrow discussion of one piece of a very large problem. Within just the context of -- Greg Winfree left, but he has got responsibility for all of DOT’s spectrum that comes into our shop. We have got GPS. We have a huge problem with GPS interference, again, illegally-modified devices. I am not going to discuss that. I am not going to discuss the international aspect, which falls on our office. I am not going to discuss having to talk to the Congress. I am not going to discuss having to talk to -- okay, that is all the things I am not discussing.

(Laughter.)

We also are responsible for White House interfaces through the Office of Science Technology and Policy, where there is a lot of stuff cooking, but that doesn't play into this immediately.

And I am not going to talk about what the National Science Foundation is doing with the National IT R&D Project on Wireless R&D, which may someday play into this.

And there are a bunch of other departmental interests in this band and in other spectrum issues. That is all off the table for now. Now I can start.

(Laughter.)

Part of what we have to do is message discipline of a policy side, not just message discipline of what Walt has been discussing. This is a hot political topic. This is what we are saying we are consistently saying:

This spectrum is uniquely capable. And we say, can we move blocks? Not easily. So, this has been the Department's position. This is what DepSec, Deputy Secretary, Mr. Porcari has stated. We recognize the 80 percent number again. We continue R&D. NHTSA is going to
make a decision. We love the safety pilot. I am going to go through these quickly because I think
you know most of this stuff.

And, of course, we always welcome the opportunity to work with our federal agencies to
solve the problem.

I want to make sure everyone understands the nature of a license, because I was hearing
some discussions here that worried me a little bit. So, let me just review.

Seventy-five megahertz of spectrum, in that band it is non-federal. That is very, very
important to this conversation. I will get to that in a moment.

It is already-shared spectrum. We share with military radio location services on a primary
basis. So, we already have to avoid them when we are doing things.

We have another primary basis, non-federal fixed satellite which Walt was talking about,
and then, there are other DoD interests where they use commercial sat points for defense
communications. This is all co-primary. We don't even have a secondary on this yet. This is just
cooprimary. So, these are the people we are already sharing with.

Quick history:

In 1999 is when the FCC originally allocated this in the original report and order. It is
cooprimary. It is not our spectrum officially. But that enabled that early implementation and
research and building what Walt has been talking about.

In 2003, the licensing and services rules under which we current operate. And those are,
when you are talking to the FCC, that is their language. Service rules, how we manage in the field,
that is what Walt was talking about.

This is what is in play. It is the service rules of March 15 of the FCC rules for this band.
It led to the early DI program, the proof-of-concept, test beds. All the standards work that has been done based on the SRC follows those service rules.

There have been some minor amendments. We still have open work, some of it very old.

Sir?

MEMBER KISSINGER: A quick question. I mean, that is a regulation that is 10 years old --

MR. KLEIN: Yes.

MEMBER KISSINGER: -- in an industry that seems to be changing every 10 minutes.

MR. KLEIN: You got it.

(Laughter.)

Agreed. As a matter of fact, the service rules still reference the old ASME standard, not the IEEE standard.

The community has not been particularly proactive in making sure we keep up. This is part of that perception. Nobody cares about this spectrum. They haven't come back to us. They haven't cleaned up their rules. They haven't done what they needed to do.

We have unofficial sharing agreements in DoD still. They have never been formally approved by the FCC.

So, these are outstanding, as I said, little pieces of work. From a service rule's point of view, it is a little piece of work, but it is part of the perception of what is going on here.

By the way, if you are interested in the details of this, there are some backup charts that I have provided.

Spectrum crunch. Okay, National Broadband Plan is part of this mix. I had the privilege
of staffing the Department's input of that back in 2010. The report came out criticizing us for not yet deploying DSRC. But we were successful because the Administration is having 500 megahertz available for commercial broadband. We kept the FCC out of that part of the discussion at that time.

I would have liked to have said I could have kept this statement out of the report. We were this close. It wasn't in the final draft we reviewed, but when it was published, it came back. We tried. But we consider legitimate criticism.

Then, more recently, the President's Council, back in July, they are freeing up spectrum. This is the statement, these two statements are ones that we are swimming upstream against right now from a policy point of view.

One is the known spectrum we should be sharing. That is now the position of the White Office of Science and Technology Policy. That is why so much spectrum-sharing research and proposals. Again, this is broader context.

Trying to free up another 1,000 megahertz of federal spectrum, we don't count against that, but that gives you an idea of where we are going with this.

Here's what Congress did: the Act, Middle Class Tax Relief Act included the whole new spectrum bill, the option of the public safety bands, things like that.

NTIA was given the role to evaluate these bands. This was new for them. For those of you who have not worked in this field before, normally, all of this has gone to FCC Engineering Technology Division. But, for whatever reason, NTIA over at the Department of Commerce, who is the government's spectrum manager, was given the responsibility for this. They are required to evaluate known and proposed technologies -- so, this is not just right today; this is looking
forward -- and the list of federal users, if the unlicensed devices come into the fed.

Now that is key. Why? This is not officially a federal use. Now, so far, we have had very good relations with NTIA and FCC. They have treated us as if this was federal spectrum. They have been very helpful in listening to us. But the fact is, if the politics changed, we could get knocked out of this tomorrow. So, we are being very, very cautious in how we manage this relationship.

But they actually have different due dates for the two bands. NTIA chose to combine the studies, mainly because it was clear that FCC was going to go forward with this rulemaking; it was going to combine it anyway.

Now the law does not require action on the DSRC band. The law does require, which I guess is called U-NII-2 -- they are calling it the U-NII-2 band -- requires the FCC to swiftly get that band open for commercial wireless. But we have been rolled into that as part of a whole process.

Now NTIA, again, we weren't included by legislation, but they have been very helpful. They have included us at every point in the process, making sure they understand our requirements, our needs, what our concerns are.

The first set of studies was released back in January, the NTIA 5 Gigahertz. It was a risk assessment. It defined -- there is a page, we have one page in it: what are the risks to DSRC of U-NII devices? And it is very clear. It is well-defined. It has been very helpful to us.

Set forth the technical study expectations. And this is where Walt and his crew are coming in. What is the data we need? Power, interference, range, frame width, all those topics. And it still does not draw that federal/non-federal distinction. And again, that is key. They are treating this whole thing like it is a federal interest, which it is because the Deputy Secretary and the
folks keep saying, "This is a federal interest. We have a goal here."

We have had formal participation as well. And this has largely been staff level. Our Deputy Administrator, Greg Winfree, is the DOT person for the official Spectrum Working Group. We have people on the IRAC. This is all government inside-baseball stuff. So, we have got various channels to work this. So, we are working both the policy and the technical sides with NTIA.

Then, you go to the FCC. Some people were taken flatfooted by the Chairman's announcement back at CES that we are going to open all this up. I would suggest that, if you are taken flatfooted, you haven't been watching.

But his statements very clearly link, to get 196 megahertz, that includes the DSRC band. So, that intent is clear.

February 20, FCC had an open meeting and created a docket for this work. Now those are the questions to which Walt was referring. The docket has still not been published in The Federal Register. Once it is, there is a 45-day comment period and another response-to-comment period.

That doesn't mean the docket closes and we can't get anything else in, but that means we are commenting on the process by which FCC will be making its decisions and saying, "You have got to consider this; you have got to consider that. These are the things you have to be aware of," and making sure everyone has got an interest in this whole band of spectrum, because it is not just us.

And I have got other DOT interests, by the way, in that spectrum that we have got to represent. All those oars are in the water.
And then, there is a public process where we can respond to other comments that have been put in the docket, things like that.

We have had a number of consultations with the FCC. We had a public panel with them back at ITS America last May. We did a formal briefing to leadership in July, and just we keep talking to them, and they keep talking to us. You know, they haven't shut us out certainly.

So, here is where we are going. This is how it looks like we are going. I told you the clock starts when it is published in The Federal Register, I have heard next week now, but I have "next week" for three weeks. So, you know, it will come.

This a lot of people are not aware of it, and let me just hit on this. It has always been, supposed to be, that because NTIA is the federal spectrum manager, that anything we do with spectrum goes via NTIA.

Well, as FCC has been very active over recent years, there has been a lot of fuzziness about the roles. And then, getting NTIA the role in law for these bands, the White House gave us a memo that said very clearly, "You will go through NTIA to make sure we speak with one voice."

Obviously, there are a lot of federal voices in this discussion. And this is the part that, as a person who works the process and the policy and talks about this, it makes me nervous. If we don't like it, we throw it out. That is a polite way of saying that.

So, we are working cautiously, carefully, and Walt is going to make very sure we get all the absolutely correct technical stuff to make the arguments. But that is where were in the policy environment.

Here is what we are planning on doing to provide these comments, pretty straightforward:

We are going to have a cover letter that sets forth our policy positions in a sense, which I
would nominate as the piece most likely to be thrown out. But we are going to go on a very open record on this. Let's be clear.

Technical work. All these: what are the issues? What do we need to test? How are we going to test them? What data can we pull from past work? Sure. That is going to go into a technical annex.

Because the next phase of NTIA's work is they are responsible for doing modeling simulations, testing, and analysis to determine the feasibility -- this is what the law says -- of these spectrum-sharing approaches.

So, once our stuff is in with them, and they will be receiving comments -- and this is new for NTIA -- they will be receiving data from non-federal sources. That is part of the thing with the law the way it was written. It used to be everything went to the FCC except the federal stuff. And then, they get to go take the federal stuff and throw it over the wall of FCC.

With now NTIA being the lead, it is going to be receiving a lot of commercial input and a lot of data, including international data. I mean, we have folks in the international community who have already started submitting interference data, power data, and things to the NTIA.

And we have been behind the scenes helping to traffic-cop that a little bit because they haven't worked in the international community before. They are the federal spectrum manager, and they look and they say, "Is this a reputable group? We don't know." So, we are trying to help them in that way as well.

Our folks will be doing independent testing analysis. What are the conditions?

As far as a deadline, that says response to FCC two weeks before the deadline. Now we are not going to have all the data two weeks before the 45 days. We are going to have the
frameworks. We are going to have the what we are doing and what we can provide by that time.

MEMBER KENNER: Can you explain independent testing? Who specifically is doing that testing?

MR. KLEIN: No, I can't. Who is specifically doing the testing? Do we have an answer on that yet? That is the goal. Do we have any selected, anybody at --

MR. LEONARD: We have a contract with ARINC right now.

MR. KLEIN: Okay. ARINC has got a contract.

MR. LEONARD: Other entities we are looking at to do some additional testing with.

MR. KLEIN: Right. As I was saying, no, we are still looking. I didn't think we had a --

MEMBER KENNER: We are going to include CAMP as well or not?

MR. LEONARD: CAMP may be doing some testing in this area. We have not specifically identified a role for them.

MR. KREEB: The OEMs met with the FCC and the NTIA through alliance groups. And the question that we are trying to understand is whether CAMP can participate or whether it has to be done through the OEM independently. So, I have had some discussions with the NHTSA lawyers on this and still haven't determined whether CAMP can work as CAMP and whether we can use the assets.

MEMBER RAJKUMAR: On that, they have an ac prototype that they can play with. I mean, interference between a little bit wifi and DSRC.

MR. LEONARD: I'm sorry, I didn't catch all that.

MR. KLEIN: Is that sort of an ac prototype?

MEMBER RAJKUMAR: Yes, the prototype is available, that ac, that they would have
MR. FEHR: We don't know of any. I am actually looking at how that would be decided because it would have to come from an organization that may have the wherewithal to actually build something like that.

There are 802.11ac devices available in the marketplace right now. I bought one and I have it in my house. But it is limited to operating in the existing U-NII band.

MEMBER RAJKUMAR: Yes. Yes.

MR. FEHR: So, it would take somebody with the wherewithal to come up with an engineering prototype based on that. We are trying to find some that might be available. We haven't gotten any indications yet.

MEMBER RAJKUMAR: Thanks.

MR. KLEIN: And then, after we are through all that, then we actually have to do the work; comment, if we are allowed to comment on the docketed comments, and that is really kind of unclear right now, what we are going to be allowed to comment on BSEC. We will keep working that.

Just another little piece, I know, Ken, your piece, talking about MAP-21 recommendations, the Administration put in a proposal when we were doing the reauthorization work on MAP-21 to require an open DSRC implementation plan that is due October 1st, 2015. So, that is in the mix right now as well.

MEMBER McCORMICK: What does it mean by frequency-neutral?

MR. KLEIN: Oh, I'm sorry. The legislation, as originally produced, just said: tell us how you are going to use DSRC from V2V and V2I.
MEMBER McCORMICK: Ah, okay.

MR. KLEIN: And then, by the time it got through the sausage grinder, the V2I piece,
they said make that frequency-neutral. V2I doesn't have to be DSRC in this report. There may be
other ways to deliver that service.

MEMBER McCORMICK: Okay.

MR. KLEIN: But that raised a few hackles in the community. So, I want to make it
clear that the V2I side of that report is frequency-neutral.

So, we have got that going on. What else?

Oops, now I have got to back up. Okay. Let's go back.

I hate to say, "What can I answer?" But what can I answer?

(Laughter.)

MEMBER McCORMICK: As I understand the way they defined whether it is an OBU
or an RSU, whether it is an onboard unit or a roadside unit --

MR. KLEIN: Yes.

MEMBER McCORMICK: -- entirely has to do with whether or not it is moving.

MR. KLEIN: It is totally dependent on stationary versus mobile.

MEMBER McCORMICK: So, you could have a mobile device that, if you are parked on
the side of the road, it becomes an RSU, but if you are driving, it is now an OBU.

MR. KLEIN: The current Part 15 rules are so old they did not project that possibility.

Part of the discussion with the current rules is defining a third type of service device which is both.

MEMBER McCORMICK: Right. It is just based on whether or not it is moving, right.

MR. KLEIN: Yes. Yes.
MEMBER McCORMICK: Okay.

MR. KLEIN: And that gets into the whole thing of distance and range. Because one of the arguments that get me frustrated, as we are talking about these, "Oh, we won't interfere with you because they are only inside builders." Last time I checked, radio waves didn't stop at windows.

(Laughter.)

MEMBER McCORMICK: Right.

MR. KLEIN: But that is just my opinion.

Sir?

MEMBER KISSINGER: Do you have any sense as to the White House's position relative to DOT's position? And the same question for the Hill. I mean, do we have any allies out there or are we fighting this battle ourselves?

MR. KLEIN: Yes. Okay.

MEMBER McCORMICK: Other than you.

MR. KLEIN: Other than me.

(Laughter.)

Jane just wave the flag if I step over the line. Here we go.

Now, in fairness, at the White House where I have been this has been going on for a while. There are two camps, very clearly. There are the folks who are "Let's do broadband, come hell or high water; we have got to open up spectrum." And there are folks who are saying, "We've got the chance to make a big difference in safety." And they are in some cases the same.

And you have to understand this is not just Science and Technology Policy. The work on this goes beyond that office to every other part of the Executive Office of the President.
So, the environmental people on environmental quality love the idea of DSRC to reduce emissions. So, it goes truly office-by-office.

On the Hill, the dynamics keep changing. Lately, all the hearings have been, how do we open up wireless spectrum? There has not been a hearing that considered any of not just DSRC concerns, but other DOT, DoD, and federal agency concerns; no discussion. It has been very one-sided the last couple of years. They do have staff who should listen to us.

She is still smiling. Good.

(Laughter.)

So, that is how the politics, policy, technology fits in. This is how we do things, our process, whatever else.

So, your goal is, do we write a letter? Sure, if you wish.

MEMBER RAJKUMAR: Yes, I could add one data point.

MR. KLEIN: Go ahead.

MEMBER RAJKUMAR: One letter was actually sent to the FCC/NTIA by a consortium of people based at universities. The effort was led by ENTREE, but then co-signed by a bunch of -- ERISA sent a response, but it was DOT. But this is coming from academia. Meanwhile, there are companies out there.

MR. KLEIN: The letters are flying.

MEMBER RAJKUMAR: Yes.

MR. KLEIN: I mean, there are letters, all of the players in policy will have gotten all these letters from the academic community, the commercial community, device manufacturers, everyone we can think of.
If you really, really, really want to know about this, even though the FCC docket is not in
The Federal Register, once a docket is open, you can file things to it, and there are a ton of letters in
there, many claims, many counterclaims already. Trust me. So, yes.

Ron?

MEMBER KIRBY: You said the system is non-federal. I mean, if NHTSA were to
enact a regulation --

MR. KLEIN: Ah.

MEMBER KIRBY: -- would it become federal?

MR. KLEIN: Then, it becomes a federal requirement on a non-federal piece of spectrum.

The FCC treats that at that point, under their rules -- okay, an example: under the FCC rules, if
NHTSA makes DSRC a requirement for safety, it becomes, by their rules, federal spectrum. Even
though the license is not owned by the government, it becomes federal by their definition. And
thus, comes under the NTIA umbrella for protection and reallocation and all that good stuff.

That is variation part of the dance because a number of the other pieces of the spectrum
with which you have concern, some are federal. They are FAA or they are Coast Guard. Some
are non-federal, but they are leased by the FAA or DoD for transportation purposes, and we use
them for all sorts of things, including some safety applications. So, those are being treated as
federal.

We are kind of -- this piece of "we" -- is kind of the odd duck in this one. It would just
have been easier for everybody if it were treated as federal because there is a decision coming.

A very good question. Thank you.

MEMBER RAJKUMAR: So, to me, I guess I would ask the Committee to consider two
positions. One is whether this Committee, Bob, should be drafting a letter or not, taking a position, No. 1. No. 2, we have companies around the table, whether they should be taking a position, a joint position, something for them to think about.

MEMBER CAPP: Anything that we do needs to be consensus for one thing.

MEMBER McCORMICK: And I am not sure that the function of this group includes recommending something to the FCC.

MEMBER RAJKUMAR: I guess maybe highlighting the --

CHAIR DENARO: What was your question, Roger?

MEMBER McCORMICK: I am not clear how the focus of this group would be to create a document that would go to some place other than where we are supposed to send our information to.

MEMBER BERG: Yes, but the spectrum is the link for this.

MEMBER McCORMICK: Right, but, I mean, the other point that he made about the other associations that we are in individually as entities -- I don't know that it would be hard to get consensus.

CHAIR DENARO: To clarify, Scott, I think if we were to choose to do a memo, it would go to our normal channel.

MEMBER McCORMICK: Okay.

CHAIR DENARO: It would go to the JPO and then, the Secretary. We are weighing-in on something that influences, say, an FCC decision, but they can choose to do what they want with it.

MEMBER McCORMICK: Okay.
CHAIR DENARO: We are sending it to the Secretary. So, you're right, but still.

And just to comment on what you said, Raj, about people, first of all, what I said is true; we need consensus.

And secondly, everyone here is not representing their organization. You serve on this Committee as an individual. Now, practically speaking, it is hard to separate yourself from your day job, but I am just saying that, that we, as a Committee, serve as individuals. That is why we were asked to be part of this, because of our individual expertise, not because of who we represent, other than the fact that some are designated in transit and rural, and that sort of thing.

MEMBER McCORMICK: So, as a protocol, would it have to be unanimous?

CHAIR DENARO: Say that again?

MEMBER McCORMICK: As a protocol, would it have to be unanimously coming from this group or just --

CHAIR DENARO: Consensus.

MEMBER McCORMICK: Okay.

MEMBER RAJKUMAR: I understand your point, Bob, on the second comment, I guess.

But I was still encouraging the individuals in the room, when they go outside the room, to come up with something, maybe a joint discussions.

CHAIR DENARO: Well, yes.

MR. KLEIN: Knowing full well that you cannot conduct --

MEMBER SCHROMSKY: Just explain what the implications of this may be, frequency-neutral? What is the purpose of that amendment? What are the implications of that?

MR. KLEIN: Okay. The implications of that piece of legislation. A bunch of our
discussions, of course, center on DSRC, and we are going to flow data to the infrastructure. And basically, a number of entities when the Congress and said, "It doesn't just have to be DSRC. There are so many other ways of getting the data, traffic safety data, traffic data, planning data, whatever it is, back to the infrastructure or between the infrastructures. That is not DSRC-dependent."

So, it is a de-coupling that, from a policy point of view, we want to keep the focus on DSRC, but it is total logic. I mean, it just says there are other ways; you need to consider other ways of delivering that.

MEMBER SCHROMSKY: You can't plan; you need the assessment?

MR. KLEIN: You can't really explain --

MR. FEHR: There are certain cases where it has unique abilities, but the uses --

MR. KLEIN: It does, but the universality of saying all of V2I must be DSRC failed the logic.

MR. FEHR: In modern automobiles, there is going to be all sorts of wireless communication/media available: wide area network, things like LTE, short-range things like wifi, or even ZigBee could be used for certain vehicle-to-infrastructure communications.

We have to focus on what DSRC is good at. Again, it works very well when you are talking about communicating with a rapidly-moving vehicle or a vehicle in a high multi-path kind of an environment. It is a certain class of communications, not all communications.

MR. KLEIN: And so, that is where that change came from and that is what we are working with. Certainly, the DSRC-specific uses we will include and consider and emphasize.

But every day there is a new way, and we don't want to squash the innovation because we need that
data for all of our applications.

MR. FEHR: Yes, as soon as you get pipes into cars, we could use those pipes.

MR. LEONARD: Raj, we are going to touch on later on today in the "ask" I have of the Committee, which is around the DSRC report that Tim alluded. If you will look at Tab F, and the last page of the highlighted Section 518.3, there is the specific language around revenue-neutral. So, you will get a chance to look at that maybe at lunch, and we can discuss it at greater length.

CHAIR DENARO: Just an agenda-check for everyone. What we are doing right after lunch, as I said, we have Charles Glass from NTIA, which will be useful for this discussion. And then, we have allocated as much as an hour and a half after our break this afternoon to talk about this and answer the question: do we want to do a memo? And if so, what should it say? And so, we have got quite a bit of time allocated to this discussion today.

I wanted to get as far as we could while we are face-to-face rather than go away and try to do this through the emails. So, we have quite a bit of time to talk about this today.

VICE CHAIR KLEIN: What is the timeframe on this? When will this be resolved? Because, right now, the DSRC, we are on pins and needles waiting for a resolution, for a decision coming out of FCC. Is that years away?

MR. KLEIN: I wish I could tell you.

MR. LEONARD: In structuring the agenda, we brought together a couple of these. One, Walt, to give us technical background, and we are trying to be balanced about this. We don't think they are ogres over at FCC and they are doing this just to mess with DSRC.

There are legitimate public policy reasons for what FCC has proposed. And hopefully, we can paint at least that portion of the picture.
In DOT, we have some other interests. But we tried to give you a technical perspective, balanced on both sides; a policy perspective from essentially a DOT position, and outlining our concerns and the departmental concerns.

We are bringing in NTIA. And I think Charles Glass, hopefully, will be able to identify their process. And so, this is a little bit new for them as well because of the uniqueness of this spectrum.

And I don't know if Charles will be able to answer that question any better than Tim will be. A lot of this depends on decisions that evolve over time. I mean, how receptive they will be to our interference studies, as you have heard Tim describe, we could do a lot of work and none of it could show up in the FCC docket because NTIA could choose not to voice what we express. And so, it might just be what individuals and companies express in that docket. So, that doesn't mean we are not going to proceed with what we are doing, but the timeline will evolve a little bit like a chess game because it depends on what actions everybody takes in the process.

MEMBER BERG: But didn't the FCC say you have 45 days to respond to this? And then, NTIA said, "Well, we have a two-year program."?

MR. LEONARD: Right, and I think we should probably let Charles talk a little bit more about that process and, then, ask some more questions about it.

But we are trying to give you a broad set of --

MR. KLEIN: The 45 days is comments to the FCC docket. More about the process.

Have they asked all the right questions? Have they considered the appropriate information for moving forward? An FCC docket can stay open forever.

But the NTIA, we see a two-year process for the technical work. Simultaneously, that
other piece, FCC is required by law to take an action within three years. Now that action could be
we are going to study it another five years.

(Laughter.)

I mean, so I can't give you much beyond that. It is as squishy as it sounds.

MEMBER RAJKUMAR: Let me say something sitting in the ivory tower. Maybe I am
afraid to say it, what people will think.

(Laughter.)

If you look at slide 10 of Tim's presentation, the first bullet I think is what I am
emphasizing. It basically talks about the FCC trying to move expeditiously to complete the
position.

That is basically, I guess, from an economic perspective, if you will, there seems to be an
emphasis on integrating wifi.

And then, my understanding is that -- Tim and Walt can correct me -- that one of the
released documents on this subject was really ahead of schedule from the Administration
perspective. One of the things happened faster than they expected.

So, to me, the train is leaving. And then, meanwhile, on the wifi side of things, I guess
what we need to do is basically put forth our interests on the table, saying that safety and lives are at
stake. And then, we could basically give our perspective, whether that means coexistence or
dedicated --

MR. FEHR: I think the proper metaphor is that the containers are on boats from China
right now.

(Laughter.)
MEMBER RAJKUMAR: Oh, I see. Okay.

VICE CHAIR KLEIN: So, being a political scientist, this is a powerful coalition moving very quickly behind the U-NII. That is the big deal.

CHAIR DENARO: Okay. Any more questions for Tim or for Walt?

(No response.)

MR. KLEIN: Thank you very much.

(Applause.)

CHAIR DENARO: Lunch is in the hallway. If you want, bring it back in here. We will reconvene at one o'clock for more of this picture.

(Whereupon, the foregoing matter went off the record for lunch at 12:02 p.m. and went back on the record at 1:06 p.m.)

The National Telecommunications and Information Administration Process

VICE CHAIR KLEIN: I will say a few words just to welcome our speaker. We are fortunate to have with us someone from the NTIA addressing the issues of spectrum allocation decisionmaking and the hearings that are happening at the FCC, the rulemaking process.

So, without further ado, Charles Glass from NTIA will give us his perspective on the process that is going on there.

MR. GLASS: Thank you very much, and good afternoon, everyone.

I am used to public speaking. So, hopefully, everyone can hear me.

VICE CHAIR KLEIN: Loud is good, particularly back here.

(Laughter.)

MR. GLASS: That I understand.
In fact, this is actually a small room compared to some of the rooms that we are required
to project into.

My name is Charles Glass. As was said, I am from the National Telecommunications and
Information Administration.

And I have got a few questions for you, so I can help tailor this discussion a little bit.

So, by show of hands, how many of you before today had heard of the Radio
Communications Subcommittee?

(Show of hands.)

That is actually a lot more than I expected.

(Laughter.)

Okay. How many of you know that we represent the federal agencies in spectrum issues
both domestically and internationally?

(Show of hands.)

Excellent. Excellent. So, you are all up-to-speed; don't need me. No.

There is a very complex issue going on right now with protection of DSRC from you all's
viewpoint and from the national level, which would be more my viewpoint, and then, from the
international viewpoint.

The one thing that you have to make sure that you don't do is confuse issues, which is very
easy to do when you are talking about domestic and international in the same breath.

They are two separate processes. Technically and legally, the two don't mix. However, a
lot of work that is done in one impacts the other.

Everyone here does realize that, regardless of the technicality of the issue that we are
discussing, that this is a legal and legislative issue, right? So, you have got to keep that in mind.

As I was saying to one of your colleagues, it is not a matter of if we are going to get from point A to point B, which is look at possible additional spectrum for mobile broadband in 5.8 gigahertz; it is about our path we are going to get there.

We have been mandated by legislation that we will -- "we," NTIA and FCC -- will take a look at this, and we have some specific requirements that that legislation requires. Some of that is, when the FCC had to start its NPRM, which should be out on the street any day now in The Federal Register. It has been released. And that is our domestic process.

So, that process, we, NTIA, will be involved in. As a co-regulator, we are required to be in these cases. We will make sure that the technical aspects of sharing are taken into account, but we can only do that if we have good information.

Now, luckily, I have found some good partners within the DOT community and within the manufacturing community now that are working with us to make sure that we have the information that we need.

So, Mr. Jim Arnold, in the back there, is our RCS representative for the Department of Transportation. He is doing a very, bang-up job of representing DOT. In general, he is doing a great job of representing the DSRC issue with respect to this.

He is making sure that we don't lose focus on this, even though industry right now is focusing on the lower band, not the upper band. And there is a reason for that, and it is a bad reason for you guys.

Internationally, there is already a mobile allocation that isn't limited the way the U.S. mobile allocation is limited. So, technically, mobile broadband can use 5.8 internationally today
without doing anything. That puts a completely different kind of pressure on us, as we are looking at this domestically and internationally.

In the U.S., we already have a mobile allocation. Now that mobile allocation currently is limited to use by DSRC systems. However, trying to explain that fine point to a Congressman or Senator is not exactly easy sometimes, especially when they have great lobbying efforts on the other side. So, it becomes more important that we are well-prepared for what we are doing.

And I know, because I have been asked to address specifically the timeline kind of issues, that that is one of the big things that you all have an interest in. Unfortunately, I can only be as specific as I am allowed by process. Unfortunately, that is not very precise right now.

We have a plan. We, NTIA, have developed a U.S. Government plan, working with DOT and the other stakeholders within the federal agencies, to lay out a very specific timeline that we are driving towards. I will tell you right now I am already a month and a half off that timeline. I was the day I released it to industry.

MEMBER McCORMICK: Ahead or behind?

(Laughter.)

MR. GLASS: Behind. And the reason I am behind is because, as you can imagine, when I work with one agency, it is easy. When I work with two agencies, it becomes harder. This particular issue, the 5-gigahertz issue, because of the two bands we are looking at, I am dealing with close to 30 agencies. I am the federal government lead for those efforts.

So, when it comes to the studies, if you have any questions, I could either answer it off the top of my head 90 percent of the time or I will be able to tell you the person to talk to who can get at the other 10 percent.
So, I did pass out my card to at least most of you. I ran out; I apologize. Feel free to contact me with any questions that you have. Okay?

With respect to timelines, you would expect somewhere around a six-month timeframe for the FCC reply comments being due. That is for an NPRM. There is almost always in the case of something this technical, this detailed, this controversial, an extension of that. So, you can expect another three to six months beyond that. And then, somewhere within six months to a year, you would have an R&O. That is about the normal process for something like this.

However, that being said, this time around, this particular issue is incredibly political. So, I wouldn't count on that normal timeline necessarily being the case.

From a mobile broadband industry perspective, the faster that is driven, the better. It allows them to start producing equipment faster. It allows them more certainty in getting money. More importantly, if there are technical problems, which there will be, it allows them to be in the lead on pushing those technical issues.

We, NTIA, are trying to stay on top and be in the lead of driving all of this. It is not easy. Separately from that domestic process, we have the international process.

Now there I can be a lot more detailed, a lot more defined.

With respect to the international process, we have from WRC-12, which was done last year in January, until WRC-15, which will take place in the November timeframe of 2015. Okay? We have an agenda. That agenda includes an agenda item, 1.1. It is the first agenda item we have, and that is looking at mobile broadband threshold spectrum.

Now that is looking at D.C. to daylight. We have a specific group within the ITU, Working Party 5D, that deals with IMT, International Mobile Telecommunications, which is
basically your broadband cellular companies.

There are five standards that were originally developed. A sixth was added to include WiMAX for IMT. Now they are working on their IMT Advanced because they realized that they couldn't actually say "generation" anymore. So, now we have this funny 4G thing that doesn't match up to anything. But that is another story.

(Laughter.)

With respect to this timeline, the requirements for the mobile broadband are due to the group inside the international community dealing with it -- there is a Joint Task Group made up of several Study Groups, but basically everyone technical. So, it is satellite. It is science services. It is mobile. It is fixed. Okay?

This group that is responsible for this will take those requirements, which are due to us by the end of this year. So, it is due by December of this year. They will take those requirements and they will start working on the technical studies internationally.

They have until early 2014 to finish those studies. And then, in the middle of 2014, we have our last meeting where we prepare what we call a conference preparatory meeting document. It is a report that contains all the technical aspects of the studies that we have done. It contains references to reports and recommendations that back up the work that we have done.

That, then, gets submitted to all of the administrations of the ITU, which is the International Telecommunications Union. They are basically responsible for international telecommunications overall. They set the policy and the regulations for use of spectrum internationally.

So, that report gets done. That is normally completed six months prior to the conference,
and then we go into the conference. That document, then, becomes a book-stop because you have already done everything you are going to do with it at that point. And then, it is administration proposals or it goes into the political realm at that point, and you have backroom discussions that work out what we are actually going to do with mobile broadband.

MEMBER McCORMICK: What is an NPRM?

MR. GLASS: A Notice of Proposed Rulemaking.

MEMBER McCORMICK: Oh, NPR? Okay.

MR. GLASS: NPRM.

And I apologize if I use a lot of acronyms. I am trying very hard not to, but it is ingrained in me. So, I do apologize for that.

So, what we are looking at, driving the timeline for us right now, domestically, it is the NPRM; internationally, it is the technical study requirements we have for this agenda item. There are essentially the same thing.

The reason that we have this agenda item is the same companies that lobbied our Congress to develop the Middle Class Tax Relief Act, which included the spectrum requirements here, are the same people that lobbied to have an agenda item to look at this. All right?

The good news is the specific industry that wants to share your spectrum right now domestically is as best a sharing partner as you could ask for. That doesn't mean it is great. It is just the best you could ask for.

(Laughter.)

On the other hand, internationally, the international mobile telecommunications crowd, the cellular companies have also targeted your band. So, they are looking at putting what they call
IMT Indoors, which no one knows what that is because it hasn't been defined yet, into the band.

The problem becoming, if a band gets designated for IMT, trying to do DSRC anywhere outside the United States or along the borders could become exceedingly difficult. That is the only impact the international has on your operations, is along the borders or if you are looking to implement the same kind of thing in another administration. But that is not something little because you need economies of scale.

There are two things going for you right now with respect to these. It is my understanding that, from a technical viewpoint, you are using a specific 802.11 standard, 802.11p, which will define the base band and the wireless access interface with respect to these systems.

The people that want to share with you domestically are the RLAN community, and they are using 802.11. So, you have the same 802 base standard which you are both working from. Whether that will help in the end, I don't know. There may be something that can be worked out in those technical communities to give quality of service to DSRC, which would make sharing very easy. On the other hand, considering the contention-based protocol that they used, which means they basically listen and schedule their own transmissions, which doesn't leave a lot of room for sharing with someone else, means that they may not be able to implement any kind of quality of service for you guys, in which case, then, they are going to have to listen for you like they are listening for radars.

We know right now that that is difficult for a non-communication system. But, on the positive side, I do know that these guys were fantastic at developing a detector that could detect a known signal. So, since 802.11p will be known, they may very well be able to implement a chip inside their device which very accurately can detect that 802.11p and move off a channel it is on.
But whether they can move far enough, considering they are looking at 160-megahertz channels, that is another story.

So, there are a lot of technical issues that are going to go into these studies. What we need to be able to do that is we need the technical information on DSRC. I am working with Jim. I am working with some of the industry partners to update our international recommendation that we have on DSRC because, come to find out, it hasn't been worked on since 1998, I believe, Jim?

Yes, 1998 was the last time it was updated.

And that comes to the other problem that we ran into with respect to this. Unfortunately, until we were already what I would consider well into this process, we were even unaware of the work on DSRC that was ongoing.

Jim raised his hand in an RCS meeting and he said, "You know, by the way, you know we have this system that is non-radar in the band, right?" And, of course, my response back to that and our boss' was, "No. Can you tell us about it?"

And that is unfortunate. We have gotten past that. We are doing great now. But I will urge you, as you all progress with your work, considering the Council that you represent, it is very important that changes, that technical developments with respect to the work that you do, NTIA is kept in the loop with respect to what you are doing. And that could be done through the Department of Transportation. It is not hard. Let us know what is going on, so that when something like legislation comes down, we immediately can flag these issues and know this is something we have got to take into account.

We, NTIA, will work diligently with DOT. The FCC will work diligently with commercial partners to make sure the international body of work is kept up-to-date because it is
great if we can do something in the United States. But if we can't use it along our borders, which
are extensive, and we can't use it internationally, so we don't get economies of scale, it is quite often
going to be too expensive to deploy. So, that is my plug for you to help us. And in return, we can
help you back.

Now I do not have specific slides to go over because I knew that there was a lot of
questions. So, I would like to open the floor and see if I can't answer all of your questions at least
as well as I can today.

MEMBER McCormick: Since Europe is allowing both 802.11p and 802.11ac, and we
have the Car-to-Car Consortium over there, if they have ac devices already in place or are going to
put them in, that should give us some knowledge as to whether or not those licensed and unlicensed
devices can cooperate and exist in a space cooperatively, which is something we don't know.

MR. Glass: Right.

MEMBER McCormick: It could also tell us whether or not they are just sensing the
presence. But presence-sensing is usually done based on packet size, and the ac uses 20, 40, 60,
80 --

MR. Glass: Right.

MEMBER McCormick: -- and the p version only uses 10. So, I mean, that would be
hugely valuable to know if somebody, if one of your counterparts has talked to the automotive
consortium over there, because it is just a slight spectrum shift from 5.9 down from what the
Europeans are using.

MR. Glass: Right. Well, the spectrum-sensing that they are utilizing goes well
beyond just looking at packet size.
MEMBER McCORMICK: Okay.

MR. GLASS: So, there is a lot of other opportunities that they have. For example, on the radars, they are looking at rise and fall time of the signal to determine whether it is a radar or not. So, there are a lot of other things that they can implement.

MEMBER McCORMICK: Now is it other licensed devices on that spectrum in Europe or is it only unlicensed?

MR. GLASS: Well, see, that is a misnomer. In Europe, Europe is not fond of using what we call unlicensed spectrum, what they call license-exempt.

MEMBER McCORMICK: Okay.

MR. GLASS: What they tend to do is they license the spectrum, and what they would do is an aerial license or a type license.

MEMBER McCORMICK: Okay.

MR. GLASS: So, it is sort of like our type acceptance for Part 15, but they allow manufacturers to self-certify. So, in the end, how good is that actually for doing any kind of spectrum-sharing? Since they are not required to actually test the devices, it is "iffy" at best.

MEMBER BELCHER: Charles, Scott Belcher from ITS America.

First of all, I thought that the final report that you all put out was good and balanced. We were very concerned going into it, as you know.

MR. GLASS: Right.

MEMBER BELCHER: Concerned largely because the incumbent stakeholder community that wasn't coming to us was involved in it. And so, thank you for at least addressing the concerns that I know DOT had and the rest of the ITS stakeholder community.
I am concerned -- and I know you may not be able to answer this at this time -- I am concerned about the political nature of the discussions. So, you guys did put forward a path to do the analysis that needs to be done, and it seems reasonable.

I never quite understood why you did 5.9 with 5.4 when Congress had directed you to do, given you an additional nine months to do the study. But, be that as it may, you did it when you did it, and you got the Commissioner coming out and saying that he is opening it up for shared uses in a very political way. And now, you have got to figure out how to work with the FCC and make sure that they take the advice and guidance that you have given them.

And so, that was a long-winded introduction.

(Laughter.)

There is a question there. The first question is -- and DOT can close their ears, and maybe you can't answer -- should we be going political at this point? Political was what changed the LightSquared discussion when it needed to be changed, and political could be the way that changes this discussion, just to make sure that we don't get out in front of our skis, that we don't make a decision without the data that is necessary. And that is what we are most concerned about.

I think everybody here believes in spectrum-sharing. I mean it is great, motherhood and apple pie.

MR. GLASS: Eight.

MEMBER BELCHER: But if it puts a single life at risk, then that is where we get concerned and are very concerned.

So, can you answer that? Or should I just --

MR. GLASS: I could answer that question, but you may not like the answer.
MEMBER BELCHER: Okay.

MR. GLASS: The answer to that question is, if you have concerns, you should always talk to your regulator and express those concerns. In this case, that would be the FCC.

If you don't believe that you are getting what you need there, the U.S. has particular processes which you may follow. And that is about the best I can answer that question.

With respect to one that you sort of asked, the reason for combining the two bands is because of how this is being approached and the fact that they are looking at using systems up to 160 megahertz. It made absolutely no sense to consider them separately because we know that the same answers that we come up with will have to be worked into both bands.

I have been raising some very difficult points lately, and I have been very fortunate to have people start listening to me. One of the things that we brought out is we, NTIA, have already done baseline studies for the lower band. And our studies indicate that DFS will not work at 5.350 to 5.470. And we are not shy about saying that at this point. We are pushing industry to look at lower-power use in the band, which may be the same approach they take in the upper band.

But the thing is we require right now in U.S. law that, at 5.250 to 5.350 and 5.470 to 5.725 megahertz, that they employ DFS. But if it is 160-megahertz channel at 5.350 to 5.470, then I could see 160-megahertz channel that encompassed both sets of bands. And if DFS is required but we don't want them using DFS in this band, then what do we do? So, there has to be a change to the U.S. law.

It is fortunate for us in one respect that the FCC decided to open up the 5-gigahertz rulemaking to everything because it allows you to address a lot of these difficult issues that pop up from a technical perspective that impact both the regulatory and the technical aspects with respect...
to sharing in these kinds of bands.

If you have 160-megahertz channel bandwidth, you very well will be using the lower adjacent band and the new proposed 5.8 band. Well, there are specific rules allowed in there. And if that system employs the same rules in your band, I can guarantee you you are going to get interference.

And that is my concern with the question about Europe. Europe is allowing the use of jointly, and the European approach, I'm afraid, is once we start seeing problems, then we will address that, because they expect industry to get together and solve that issue. So, if it becomes too much of a problem, then they will address it.

I am not real comfortable with that when we are looking at safety aspects with respect to DSRC. So, in that particular case, you want to address those issues upfront, not when they happen and just rely on industry to solve that problem.

VICE CHAIR KLEIN: Just to follow up on that point, so the counterparts to the transportation community overseas in Europe have addressed this issue, it is already settled, and they have opted for a shared approach? Did I understand that --

MR. GLASS: I would not say it is settled.

VICE CHAIR KLEIN: But it is that situation?

MR. GLASS: There was a directive from the EU to CEPT, which is the spectrum regulator, if you want to call it that, in Europe, to examine sharing at both bands, so 5.8 being one of those.

What is being looked at right now is a shared approach where they would allow 802.11ac and 802.11p in the same band. There has not been what we would call a rulemaking yet with
respect to that. They have not issued a decision on that. But, in the interim, those are the rules.

And that is a fairly normal approach for them. It is let's see what industry can do, and then, if they can't work it out, we will issue a decision and say this is what you will do.

MEMBER BELCHER: And so, the one thing I would say about that is the application sets they are looking at in Europe are not safety-based applications. They are mobility-based applications where interference is not as critical.

MR. GLASS: Right, and that is the big difference between Europe and the U.S. now, is the applications they are looking at are more on traffic management, rather than looking at the protection of the driver.

VICE CHAIR KLEIN: Right. At this point sharing is no problem.

MR. GLASS: Right.

VICE CHAIR KLEIN: It is not an issue.

MEMBER BERG: We don't know that yet. We don't know if sharing is a problem.

VICE CHAIR KLEIN: Well, functionally-wise. I mean, they might have interference and things like that. But if your traffic management is delayed by a millisecond, it won't kill you.

MR. GLASS: Yes, but, then, that becomes a political issue, too. So, it is still an issue.

So, with respect to the timeline that we have, we are working with DOT and the automotive associations to develop changes to the technical characteristics. We hope to have that in in time for the upcoming July meeting -- or sorry -- the main meeting of Working Party 5A, which is the technical group responsible for ITS. So, it would go into that group.

We also hope to have at least initial studies completed in time for the July Joint Task Group meeting, which is the group responsible internationally for the mobile broadband studies.
We are working on that right now. However, the industry focus to this point, this 5.350 to 5.470 megahertz, I think on the urging of the FCC, they may not even address 5.8 in the near future, if at all. They may wait and address that specifically only in the NPRM. Because, like I said, internationally, they already have mobile access internationally. So, there would be nothing they would need to do to sell these devices internationally.

It is helpful to have the RLAN designation, which we did for the two adjacent bands, 5.350 to 5.470. However, it is not required for them to sell the devices. So, they may stay out of the international arena with that.

If that happens, we, NTIA, will work studies still. However, we are pressure-driven. Unless there is pressure from the industry groups, both sides, the automotive manufacturers that are going to be doing DSRC and the wifi manufacturers, we may wait a while before we get the 5.8 studies done. A lot of that will depend on where industry is at with 5.3.

We are proceeding forward with studies that are looking at low-power use there, and industry is going to give us a response soon with respect to that. So, we will have a better idea of what we will be looking at in the upper band after that.

MEMBER RAJKUMAR: Charles, thanks for the nice summary of the process. I guess just let me give you a quick summary of what at least is on my mind, if you will. I am Raj Rajkumar from a university, Carnegie-Mellon.

I guess with 5.850 band of DSRC we are looking at, we understand that that band, if useful on wifi, 802.11ac, it has lots and lots of economic benefits and customer benefits. We understand and appreciate that.

At the same time, DSRC uses it for safety purposes. It is also is a huge customer benefit
as well.

So, I guess in our sense we can see whether the two, whether they need to coexist; that is
an issue, of course. And then, one solution that we have been discussing is that, if they coexist,
would something like the following be workable:

You have, for example, 802.11ac transmits if it does not hear any 802.11p packets. But if
it does hear any 802.11p packets, it backs off and goes silent for a while. Would something like
that be considered? It is a non-starter? Reasonable?

MR. GLASS: What you will typically find is that they wouldn't go silent. What they
would do is move to another band where they could --

MEMBER RAJKUMAR: Yes.

MR. GLASS: -- then operate, which is a type of DFS.

MEMBER RAJKUMAR: Yes. I understand.

MR. GLASS: So, DFS may work for you guys in the upper band.

MEMBER STEENMAN: What does DFS stand for?


MEMBER STEENMAN: Oh, all right.

MR. GLASS: What it is is a protocol that enables them to sense and avoid other --

MEMBER RAJKUMAR: So, that would be, for example, a solution that allows us to
coexist?

MR. GLASS: It is entirely possible. The other solution may be that you could work
quality of service into the 802.11 protocol. So, much like we have 802.11h, which defines DFS,
you could have another letter which defines base band sharing between p and ac. In that case, what
it could do is give priority to packets from p over ac, but it wouldn't necessarily move off the
channel or stop transmitting.

MEMBER RAJKUMAR: But, from our perspective, 802.11p is targeting safety
applications but latency is a huge deal.

MR. GLASS: Right. And, of course, industry is going to push you on how much
latency you can accept because they are going to want to stop their false alarm rate.

MEMBER RAJKUMAR: Yes, yes.

MR. GLASS: So, it is a give and a take.

MEMBER RAJKUMAR: Yes.

MR. GLASS: And the big thing there is knowing what your requirements are.

Yes, Hans?

VICE CHAIR KLEIN: So, we are looking at a complex and, frankly, fascinating policy
process, political policy process, but the decision, as I understand it -- and I am not sure I do fully
understand it -- but, as I understand it, it is somewhat simple.

The first decision is licensed versus unlicensed. Will we take licensed spectrum and
allow unlicensed uses?

Should that happen, then the next question is successful coexistence or unsuccessful
coexistence. That is kind of a technical question.

Have I correctly characterized the ultimate decision space as being, essentially, these two
decisions or could we go to the IEEE and get the p's and the ac's to hammer out and change the
possible technical parameters and change what the decision space is? Or is the decision space
pretty reliably fixed?
MR. GLASS: Yes and no.

(Laughter.)

VICE CHAIR KLEIN: Yes, yes.

MR. GLASS: Well, it is political, as you well know. So, right now, Congress is determined that we will look at this, and there are certain requirements, one of which is no impact to existing services.

Now let's look at a hypothetical with respect to that. Let's say everything is fine with respect to sharing with all the other federal agencies except for DOT. That is the only hangup. And the wifi industry complains to Congress that, in fact, that is too onerous. They are using the same kind of standard. Why should you all be giving priority over them? They are going to bring in billions of dollars in jobs and all of that. Then, what happens?

So, then, it becomes an argument between you guys and them with Congress to determine whether Congress changes the rules we have now or not. So, we have seen that in the past. It is unlikely, I would say, in my opinion, but I am an optimist.

But I think, given what we have right now, the real decision, as I said at the very beginning, isn't "if" it is wireless use; it is "how" wireless use.

So, we have been mandated at NTIA that we will do more spectrum-sharing, and that is our mindset. That is what the Administration is telling us. We have the 500-megahertz spectrum initiative, PCAST. After that came out, it said we need to give up a gig, but we need to look at it as shared.

So, we are not even looking at a number at this point. What we know is, from now until probably forever, our mindset is going to be sharing that mantra. So, there is not going to be any
less pressure than we have right now today on spectrum. So, it is going to be about the process of how we get there, not if.

MEMBER ALBERT: With the mandate of not disturbing what is existing there, and the notion that you seem to imply that there would be a big public outcry and that there is an existing public base if something gets disturbed, does that mean on the other end of the spectrum there is the U.S. DOT, who really does not have any groundswell of public support for what they are doing in connected vehicle, that the DOT needs to come up with a better public education campaign to build a constituent base of public folks?

MR. GLASS: Well, let me go back to the question that was asked by ITS because it is the same question. It was, do we need to go political? And that is what you are asking --

MEMBER ALBERT: Yes.

MR. GLASS: -- in effect --

MEMBER ALBERT: Yes.

MR. GLASS: -- is, do we need to go political? The problem is that, right now, all the Congress has heard from is the wifi and the IMT crowd as to what their burgeoning requirements are. And right now, it is the only fully successful sector in the U.S. economy. They have not had a decline of any sort, even through all of the financial troubles.

MEMBER ALBERT: So, we need to fabricate demand?

MR. GLASS: No.

(Laughter.)

You can never match demand. You will never be able to match demand. However, you have got a strong case, DOT has a strong case because you are providing a service that cannot be
provided by anyone else. And, in fact, it is a safety service.

If the numbers are even close to what we are hearing of 80 percent reduction in non-distracted driver, or only distracted driver, not impaired driver, accidents, that is huge. I mean, that is not a minor accomplishment. That is huge.

I could guarantee you safety of life sells with Congress. It will always sell. Because the more constituents I keep alive, the more people that vote for me.

(Laughter.)

MEMBER KIRBY: That seems to be the compelling point, is whether the safety case can be made convincingly enough.

Has this case been made in Europe? Has there a conscious decision been made or has it just not been discussed or not been advocated effectively?

MR. GLASS: What has been explained to me from the DOT crowd, overall, and from the manufacturers is in Europe the focus to date has not been on safety at all. They are relying on the U.S. to develop that. And that message has not really clearly been expressed overseas.

So, that may be some advocacy that you guys need to look at, is getting that message out, getting them looking at this kind of thing. Because, again, we are well into this process. It started in 2012. We have to finish the studies in 2014. That is next year.

So, if we are not done by the middle of next year, then the whole decision on this band becomes political. And if you haven't sold your partners overseas on this, when it gets to that political environment internationally, you have lost, because I can guarantee you the wifi industry and the IMT industry is selling those regulator on what is going on.

Anyone else?
MEMBER CALABRESE: Some have made the decision you can do both. I mean, we all would love to do both. We would love to have that available, and we would love to keep it for safety-sensitive issues.

I mean, are you with us? Can we do both safely? What do you think?

MR. GLASS: Of course you can. There is absolutely no reason why you can't. In fact, the way the requirement right now is written in the legislation, we should not be impinging on your ability to do both because it doesn't talk about what kinds of applications. It says it will not affect federal operations.

MEMBER CALABRESE: But you think technologically it can be done?

MR. GLASS: I think technologically it can be done. I have been amazed. In 2003, when we did this working on the other 5-gigahertz bands, I was amazed at how smart industry is. I was also amazed at how offhanded they would be.

(Laughter.)

You can't underestimate a strong constituent base, that they are out for their own good. And you have to keep that in mind at all times.

So, although you come to the table, you work with them, you expect the best, you have to plan for the worst. So, you have to trust but verify.

(Laughter.)

And that is the case where you guys are going to be.

Now one of the other questions that came up -- again, this is a convoluted process, and I am trying to make that clear -- you asked about whether 802.11p and ac might do this at the 802.11 level. You have to plan for that. Because if ac comes in and pushes a solution there, and they can
sell the FCC that they did that while you all were sleeping and not paying attention to it, then that is what the FCC is going to put in their rules.

And I am not going to have a strong argument against that because you all are involved in the standards work or should be. I know the automotive manufacturers are. If they are not representing you well, then you have got to make sure you are representing you well.

I think the automotive manufacturers will. I am working with them. I am working with some of the reps there. But that is a fine line for us. I have got to be very careful from a legal perspective how I work with industry because you get into FACA committee rules and all that stuff, Federal Advisory Committee Act, and I have got to be careful. I typically can only deal with one company at a time, unless we are working on the international side, where we have a FACA committee that we are working under.

MEMBER McCormick: I would like to clarify something. The European Initiative under the Car-to-Car Consortium isn't solely looking at mobility.

MR. GLASS: Okay.

MEMBER McCormick: They are looking at not only V2I, but V2V as well, and looking to develop a European deployment initiative for it. They are all the same automakers that were involved in the VII Consortium and in AMIC before that. Their ability to implement is hindered by how things actually can get approved and moved through the individual states within the EU.

The other issue about the ITU specifically, the ITU is part of the United Nations Consortium of Committees. In 2002 and 2003, I was the Vice Chair of the ITU's Committee on Vehicle Communication Standardizations. We had a number of meetings with the world's
telecoms, all of whom at that time wanted to view the car as basically a mobile communication
device.

We sat down with all the lawyers, or I did, and had a lengthy discussion about why they
couldn't do whatever they wanted to do within the car. And my answer to them was we can as long
as you will take the responsibility for the liability if something causes a death or accident, at which
point they backed off.

At the time, they didn't have an understanding of what they wanted to do other than to
utilize the device as another portal for part of their business model. They have refined that over
time to get to where they are at now.

The ITU-T, even though you don't get to vote unless you are a country, the bottom line is
that it is obviously entirely governed by the world's telecoms in terms of the direction that they want
to go and where they want to go, right?

So, fortunately, the Car-to-Car Consortium is moving the work that they are developing
into ETCE. The U.S. Government is harmonizing what they are doing with ETCE as well as the
Japanese.

And so, even though they do allow the multiple use over there, the expectation is that they
will protect that spectrum for the automakers.

MR. GLASS: Now there are two problems, though.

MEMBER McCORMICK: There's more than that.

(Laughter.)

MR. GLASS: Well, ITU-T is fixed infrastructure.

MEMBER McCORMICK: Right.
MR. GLASS: ITU-R is --

MEMBER McCORMICK: Is research.

MR. GLASS: -- the spectrum.

MEMBER McCORMICK: Yes, but it is just research.

MR. GLASS: No, it is not; it is regulations.

MEMBER McCORMICK: Well, okay. Sorry.

MR. GLASS: And the problem that comes in is there are times -- and we are seeing this more and more -- where ITU-T takes on work which really should be over in ITU-R. So, those regulators have no clue this work is being done. I had no idea that any of that was done in the timeframe you mentioned.

MEMBER McCORMICK: Right.

MR. GLASS: And I am heavily involved in that community.

ITS America didn't bring any of that into the R sector. So, we were unaware that that work was being accomplished.

The other problem that you are facing right now is none of that consortium work has been raised up to the regulators yet, or at least not the regulators that deal in that environment, and they are the same people that are going to write the decision. So, they are not aware that that work is ongoing.

I think that that may be part of the driver behind the IU mandating them taking a look at this, I could guess. But none of that has gone anywhere to date. So, we need to make sure that people are plugged into that process and making sure that they are aware of these issues and these requirements.
MEMBER KENNER: I had a question.

MR. GLASS: Yes?

MEMBER KENNER: Were you in the room during the presentations before lunch?

MR. GLASS: I was not.

MEMBER KENNER: Okay. So, let me just say in the last presentation it said that "The next phase of the NTIA study will involve modeling, simulation, testing, and analysis to determine the feasibility of the spectrum-sharing approaches."

MR. GLASS: Yes.

MEMBER KENNER: So, if that is accurate, can you give us a sense of sort of who is going to do what by when?

MR. GLASS: Absolutely. Obviously, I am not going to be able to give you absolutes, but I can give you what is in our work plan.

MEMBER KENNER: Yes.

MR. GLASS: What we expect to happen is, as I said, we will have an initial studies done in the June timeframe for our July meeting, so we can submit that internationally. That may or may not include 5.8. It may be more realistic to say that the 5.8 would be taken care of in our spring 2014 meeting, which is going to be in the April-May timeframe. So, we would have those studies completed by then.

Once we were happy domestically with the studies, which means probably the NPRM has closed, and they are working on or have finished the R&O, then we would go into testing phase to figure out exactly how do you type acceptance for these kinds of devices.

And that would be between the FCC and NTIA. We would work on that. We would
work with industry partners as much as feasible in that timeframe.

And once we get that, we would do bench-testing. So, I would expect bench-testing, if we are able to afford funding it at NTIA, would be somewhere towards the end of next year. And then, we would look at field-testing following that, depending on how the bench-testing goes.

What the bench-testing allows us to do is to test the procedures we have come up with and see if they work. That is all it is for, is to verify the procedures.

When we did this in 2003 -- well, actually, we did the bench-testing in like 2004 after the conference. The bench-testing showed us that industry had built exactly what we asked them to build. We had given them three radar signals to detect, and that was all they could detect, which is obviously not adequate.

So, we ended up going to a variable parameter testing procedure. We did another round of bench-testing after that. And then, we were able to go on to the field-testing. We did two rounds of field-testing.

And so, from 2003 to 2007 is when we were doing the actual testing phase. So, it can take quite a while.

MEMBER KENNER: So, between now and either this summer for the 5.8-.9 next spring, you are really doing simulation work between now and then?

MR. GLASS: Right. Right.

MEMBER KENNER: And is that contained within the NTIA? Or do you contract with some other group to actually perform the work?

MR. GLASS: Well, we are leading a government group right now which is made up of all of the IRAC agencies, Interdepartment Radio Advisory Committee. And they will be
participating in this, but our goal is that the NTIA Spectrum Engineering and Analysis Division will actually ultimately be responsible for running all of the analysis.

So, what we would look to do is to verify the model with outside models from both industry and from the government. Once everyone is happy that we are coming up with the same answers, so we know the model is valid, then NTIA would do the runs.

The way we are doing that is a statistical approach. So, what we do is we randomize the deployment of devices and the radar. We do 1,000 runs, each run being randomized. And then, we look at where approximately 95 percent of them fall under a specific level. And that gives us a good confidence that we are actually looking at what would be a realistic answer.

So, that is the way we will perform the analysis. In this particular case, we are looking at a lot less variables because, as I said, in the lower band at least we are looking at low power use. So, there is a lot less you have to define.

Now in the upper band, that may very well be a different story. The kind of radars that we have up there from the government side, DoD, DHS, would allow for higher power operations, but the DSRC may not. And they may or may not be able to detect the DSRC signal. I would suspect, since it is 802 product, it would be fairly easy for them to detect your packets over theirs, and move channel if you are on it, or transmit when you are not. So, they may read your contention protocol and know when they can transmit.

MEMBER McCORMICK: I am not a spectrum guy, but I had just a simple question. If they are transmitting on it and my car needs to use it, it doesn't preempt them; they get to finish, right? Or does it --

MR. GLASS: That depends on how often they listen.
MEMBER McCORMICK: Okay.

MR. GLASS: It all depends on how often they listen, and it depends on where they listen. It depends on whether you have a hidden node. There are a lot of technical facts that go into that, and that will all have to be involved.

One thing we do not have right now at NTIA is any kind of idea how to model the DSRC in a deployment scenario. This is something that we raised with DOT. I know DOT is thinking along those lines. But, as a Committee, it is something that you all probably should be investigating as well.

We have heard up to 200 cars packed in as tight as they can go. Well, yes, I might see that on the freeway occasionally during a traffic jam, but at that point how much is the DSRC letting me know what is going on, if I am not moving and they are not moving? So, we probably wouldn't go with quite that dense a model, but we need to know an accurate model for looking at these devices, which means we needs projections and all that kind of stuff.

MR. LUCAS: Yes. We had some work ongoing with the Crash Avoidance Metrics Partnership in our scalability research that will identify scenarios with much higher density than you just mentioned, over 1,000 in an area with six lanes of freeway and express lanes and adjacent lane, like frontage roads and overpasses. So, we will have a lot of stationary vehicles, but you also have lanes that are moving with thousands of people most likely.

MR. GLASS: Right.

MR. FEHR: The other thing, we have to keep in mind that the actual opposite case may actually may be the one that --

MEMBER McCORMICK: Could you guys stand up, because we can't hear up here?
Thank you.

MR. FEHR: The opposite case may actually be the more difficult one. You know, the two cars as opposed to 200 cars are probably going to be more difficult to detect, and they still have to work.

MR. GLASS: Right, and that is a very good point. One thing that we found in doing the initial studies back in 2003 is every assumption that we thought was worst-case was best-case.

(Laughter.)

For the RLANs, not for the radars.

So, everything was counterintuitive when we started looking at this. I suspect you are exactly right because, without that density, it will be harder for them to detect.

One of my concerns that I have is, when you have a vehicle moving at highway speeds, 65-70 miles an hour, you are changing our land zones really quick, and how fast can they detect and avoid that emergency signal you need when someone slams on their brake? So, it is something you have to take into account.

MEMBER ALBERT: Does that mean that rural low volume that only has two cars on it is really worst-case scenario?

MR. GLASS: It could very well be. And, in fact, rural may not be an issue because they may say, "Well, we are not deploying that." So, that is the counterargument.

(Laughter.)

MEMBER ALBERT: You even know what I am leading up to.

(Laughter.)

You can leave now.
(Laughter.)

MR. GLASS: And they can say that, but I can read in the news where small towns are employing wifi for their citizens. So, that doesn't mean that they won't be there. It just means that the commercial entities aren't paying to put them there.

MEMBER ALBERT: So, if 60 percent of fatalities are in rural areas, which are low-volume worst-case, that means we are going to put more in urban areas where the fatalities are less.

MR. GLASS: Right.

MEMBER BERG: Will those models, all that study be public?

MR. GLASS: It will be public, yes.

MEMBER BERG: Okay.

MR. GLASS: Because of the path that we are taking, because we have the international requirements to study this, we are doing this in the international FACA Committee that the State Department has established for the appropriate Working Party.

So, the spectrum requirements for ITS, the spectrum requirements for the wifi are being worked in the Working Party 5A that I mentioned. So, that is being done there. We have got the Joint Task Group, where the sharing studies will go on. So, we have already submitted our two baseline studies, not that FCC liked them, but we submitted them.

We are working on changing that now for what we will submit internationally on those two bands. We are working on industry on coming up with what they are modeling with respect to this. It will be the same, exact modeling, then, that I would use for the DSRC.

One of the things that we have to carefully look at is they are doing their spectrum
requirements. And if their spectrum requirements are anything like they were last time, which was a user density where they looked at 10,000 users per square kilometer and 80 percent of them had one or more devices with some number of those being on inactive at a given time, frankly, it is an unrealistic number, in my viewpoint.

Because one of the things that is discounted there is I am not using that same device in the urban and the suburban and the rural at the same time because I moved between those zones. And the other thing that is unrealistic is I may have five devices that have wifi on it, but they are not all five talking at the same time, because I am going to be using my tablet or I am going to be using my phone, and I don't usually have my tablet -- you know, up to my head and doing something on my tablet at the same time. There are a few people that do that, but that is not the model.

VICE CHAIR KLEIN: I realize we are running out of time.

Did I quote you correctly? "Sharing will happen."? Did you say that a minute ago?

MR. GLASS: I did not say that definitively.

(Laughter.)

I said "my opinion".

VICE CHAIR KLEIN: The previous speaker --

MR. GLASS: Yes.

VICE CHAIR KLEIN: The previous speaker -- I am putting together the pieces here -- the Report from the President's Council, sounds a lot like the Administration, the norm should be sharing.

MR. GLASS: Yes.

VICE CHAIR KLEIN: A few slides later, it says federal input from like DOT to FCC
goes via NTIA.

MR. GLASS: Yes.

VICE CHAIR KLEIN: And NTIA may decide that the filing should not be submitted if proposed comments are inconsistent with administrative positions. But administrative positions were the norm should be sharing.

Is it possible that advocacy of sharing won't even make it to the FCC? It will be stopped at the NTIA, using the presidential focus?

MR. GLASS: Highly unlikely.

VICE CHAIR KLEIN: Highly unlikely?

MR. GLASS: Let me explain that process to you, which I think is very important for you to understand.

NTIA is still very much of a technical mindset. We believe that the technical truth of the issue should determine what we do. We lobby -- well, bad word -- we can't lobby.

(Laughter.)

We work with Congress to make sure that they understand -- we educate them -- that some things are possible; some aren't. So, we have been successful to date. When you see the legislation, it says NTIA will set the rules. Sometimes when we set the rules, sharing isn't possible then, because the guys that want it say, "Well, we can't use that." Then, politics comes in, and it may be taken out of our hands.

What will happen with respect to this is let's say DOT comes in with a sharing study to us, and their sharing study says that they want to consider 500,000 devices per square kilometer. We are probably not going to accept that, unless you have really good justification for those numbers.
So, that is the kind of thing we might not take to the FCC. We are not going to take what we would consider unrealistic technical aspects in and, then, advocate that position, because we can't support that. And what we are being told is we have to look at more sharing.

So, when you asked about whether I said we will be sharing, the answer to that is, in general, yes. A specific band? That depends on the technical aspects of that band.

VICE CHAIR KLEIN: Okay. The technical aspects?

MR. GLASS: Right.

VICE CHAIR KLEIN: I think Raj and then Ken.

MEMBER RAJKUMAR: So, I think sharing, I guess, is probably the logical way to go. But I think from a DSRC perspective of latency for safety applications, we really want prioritized sharing for DSRC or 802.11ac packets in a shared environment, right?

VICE CHAIR KLEIN: Which the standard does say, because the license takes priority over unlicensed.

MR. GLASS: Right. And, in fact, in this case, the incumbent takes priority over it.

MEMBER McCORMICK: Okay.

VICE CHAIR KLEIN: Say that again?

MR. GLASS: The incumbent takes priority of it.

VICE CHAIR KLEIN: Or an unlicensed incumbent takes priority over a licensed? Is that right?

MR. GLASS: Right now, with the FCC, you could probably argue that. We have seen problems with that. They denied amateur service in one band because of unlicensed broadband over power lines. So, the incumbent is usually the one that has more power.
MEMBER BERG: Whether it is licensed or not?

MR. GLASS: Whether it is licensed or not. However, it depends on what is being offered. So, it depends on how politically-sensitive it is.

So, in this particular case, again, you are looking at this from a general perspective of, well, we are licensed, but I have got to point you back to you are DSRC. And as DSRC, as DOT is responsible for this and the automotive industry is responsible for this, you have got a large power block there. So, you are important.

We know about it. So, it is easy to defend. It is the cases where the use is very little or very little known that it may or may not be given precedent, even if it licensed.

There have been times where the FCC has taken the licensee out of the band and put other services in there because the use wasn't significant enough to warrant keeping them there.

VICE CHAIR KLEIN: Ken, last question.

MR. LEONARD: Well, I thought I heard you say two things. One, that some frequency-sharing technologies were not working in the lower portion of the band. But I also thought I heard you say you thought the technology either was there or would be there to allow sharing.

My question is, is there currently a spectrum-sharing technology that could be employed that would not interfere with DSRC in its current spectrum the way it is envisioned for safety uses?

MR. GLASS: Absolutely none that I am aware of, whether it is safety or not.

MR. LEONARD: So, are we --

MR. GLASS: It would have to be redesigned to meet the need.

MR. LEONARD: And are we assured that, one, no action would be taken to impinge on
DSRC before that technology is developed and thoroughly tested in a field environment to make sure that we don't deploy a system and, then, find out we have inadvertently opened Pandora's box and we can't go back? That unlicensed devices are now using that spectrum and somehow interfering with it in ways we didn't anticipate.

MR. GLASS: Oh, now you are getting into an area that is beyond sort of the knowable right now.

MR. LEONARD: Yes.

MR. GLASS: I mean, that all depends on the process followed with the NTIA. And we, frankly, don't know how that will go.

Typically, what would happen is the NPRM would come out. You know, the FCC would consider it, based on the comments they get back, some of which will be filed by NTIA on behalf of the federal agencies. I am sure the automotive industry for the DSRC will also file comments with respect to this. And then, they will move from there into the R&O stage at some point. They may do a further NPRM or they may just go straight to the R&O.

It is possible, like they did before, where they set the rules, but the implementation of it isn't set. So, they said, "Okay, we are going to do DFS, but we are waiting on this test signal. And once that is developed, we will publish it."

Now the rule was set to allow sharing, but if the testing never was able to be worked out, then they would have had to have come back and done a further R&O to address that issue. So, that is not really a question I can answer because it depends on the path the FCC follows. And I don't think they even know where they are going to go there yet, because it will depend a lot on the comments received.
MR. LEONARD: Okay.

VICE CHAIR KLEIN: Okay. Thank you very much.

(Applause.)

CHAIR DENARO: We will take a break until, why don't we make it until 2:30? Then, we are going to come back and talk about this and the position we want to take.

I think what we would like to do, also, then, so I will just let you know now, we will take another short break before Ken gets up. I think what I would recommend is we will go outside and do some quick calisthenics and get everybody freshened back up, so we have a clear mind to listen to Ken.

(Laughter.)

So, we will take a short break before that, and then go through that.

VICE CHAIR KLEIN: So, back at 2:30.

(Whereupon, the foregoing matter went off the record at 2:10 p.m. and went back on the record at 2:32 p.m.)

Committee Discussion

VICE CHAIR KLEIN: Okay. This session, we are going to try to be a little more action-oriented. So, it will be a flip chart session. This is our first. We are not listening on this one; we are discussing as a Committee and quite possibly producing some ideas and actions here.

So, if you don't mind, George, I am going to be sort of behind you. Stay there, but I will be immediately behind you there.

On this session, this is our spectrum discussion session. We have heard now three speakers on spectrum. I think we would all agree that these were very interesting sessions, and the
stakes are significant. The history is fascinating and informative, and the future is challenging and there is a lot going and the stakes are high.

So, a question for us here is, do we see ourselves as having some kind of a role in this, presumably as an Advisory Committee generating some advice? Do we want to give advice on this? Who would we give it to? And then, perhaps more significantly, what kind of advice would we give? What would be the salient points?

I think the first point, is this an issue where the ITS PAC should weigh-in? I am guessing we might be close to a shared view on this. But if anybody has a comment on should we get involved in this or not? It seems to me that we should. It seems that there is an opportunity here, even a need, even an urgent need perhaps, for this, for an action here, and quite appropriately so for an outside, external advisory committee to weigh-in.

Does anybody have a comment on that or agreement or disagreement or a caution area, or anything like that? Do we have a consensus in the Committee to take some action here?

MEMBER McCORMICK: Does anyone disagree?

MEMBER RAJKUMAR: I agree with what is said here. I would suggest that the Committee consider adding a recommendation to our memo saying something like, "The U.S. DOT should be working with their counterparts in other countries to raise the international awareness."

One of the comments that we heard from Charles Glass was that internationally there is a push towards wifi, gigabit wifi, and they don't share the same level of concerns outside the country. So, I think DOT should be working with their counterparts in other countries to raise the level of awareness, so that pressure doesn't come from the outside.

MEMBER McCORMICK: Well, since it is already approved over there, getting them to reverse that is going to be a lot more
difficult. I mean, you know, originally, when we were looking at the whole DSRC bandwidth 10
to 11 years ago --

MEMBER RAJKUMAR: Yes.

MEMBER McCORMICK: -- there were only two channels available in Europe.

MEMBER RAJKUMAR: Uh-hum.

MEMBER McCORMICK: They looked at where we were going and what we were
doing, and they, then, passed laws to fix that.

MEMBER RAJKUMAR: Uh-hum.

MEMBER McCORMICK: So that it would be as much bandwidth as possible.

My personal opinion -- and I will be glad to defer to any on this, but having dealt with
them for 15 years -- if they see a leadership activity going on here, it is much easier to get them to
change course than it is to try to do it now, before we have anything implemented. Because there
is not anything that they are going to bring to the party to change a decision here.

VICE CHAIR KLEIN: I am not sure there is a downside to outreach to counterparts,
because this is kind of getting that flywheel going. So, I think making sure, and I think that is one
of my take-aways from the last three sessions, is get started early, keep an eye on this, be talking to
the other parties. So, I think there is no downside to the kind of thing you are recommending there,
which is reaching out to counterparts.

I am going to make a list of some of the concrete ideas here. Outreach to overseas
counterparts.

Scott?

MEMBER BELCHER: I would just comment that I think we should think about whether
the Program Advisory Committee should take action prior to its advice memo. Because, as you heard Charles talking about, this is a political decision that from the FCC’s perspective is in a much different, could be in a much different timeframe than the NTIA decision.

So, where we could have impact sooner rather than later is to do an advice memo or a memo to Congress in our capacity, just letting Congress know that this is an important issue to the Program Advisory Committee and that we believe that it is important that they ensure that the FCC protect this band for safety.

VICE CHAIR KLEIN: Yes. So, it is key issue: timing.

MEMBER BELCHER: Yes.

VICE CHAIR KLEIN: And the timing, this is not DOT timing; this is FCC timing.

Essentially, that is the procedure, the process, we are looking at.

CHAIR DENARO: Scott, you missed our discussion this morning, but that is how we couched it, actually. We have an advice memo at the end of the year, but we are talking about doing a special memo right now on this other --

MEMBER BELCHER: I am sorry I missed it.

CHAIR DENARO: Well, exactly what you said.

VICE CHAIR KLEIN: Yes. So, we can. We have already issued one interim memo, and we have considered two more, one directed more towards NHTSA and here one really directed towards the FCC.

MEMBER STEENMAN: We need to kind of deploy what he said, hope for the best; plan for the worst philosophy. Given the momentum in 5 gigahertz with wifi, what is going on in Euro, probably the U.S. views that we are currently maybe not even competitive based on what is
going on overseas, and they will have lots of broadband, we don't, this thing is going to roll, right?

And industry will push very, very hard to make this happen because society in general benefits so much from it that they will just make it happen.

So, I think we, as an industry, are not doing enough with this shared bandwidth technical evaluation, and even figure out, basically, how you can make it work, which is like to plan for the worst. Because to push really hard for a separate band, if that never happens, if there is no real good technical fallback, the whole program will just fall apart, right? There is nothing left.

VICE CHAIR KLEIN: Right. And we can ask for the sharing, but be ready to -- the message I am getting is there is going to be sharing, and therefore, move to the technical level and manage the sharing. That is the place where there is a play.

MEMBER STEENMAN: There is a lot more activity that needs to go on between, I think, RITA, the industry, to figure out this challenge.

MEMBER McCORMICK: I wholeheartedly agree with that because, if we do that, you know, one recommendation, whether we send it to the FCC or directly to the Secretary is fine, but there ought to be a second recommendation, exactly what he says, that says one of the things we don't have is knowledge about whether or not they can cooperate at all.

I mean, first of all, the reason we are doing the safety pilot is to figure out whether or not the spectrum is usable, right? We all think it is, but that is the purpose of the scalability exercise, is to find out if it actually will work.

So, assuming it does, our recommendation shouldn't just be that we want to protect it. It is that, possibly it is that we want to encourage the DOT to encourage research in the area to determine whether or not these things can play cooperatively.
MEMBER STEENMAN: And then, we can maybe say, under these four conditions, and if it gets implemented that way, sharing is possible, it might be a much more likely path to success.

VICE CHAIR KLEIN: Or there is the question of the burden of the proof in some ways, right? One question is, do we want to say, "We would prefer there is no sharing, but if there is sharing, the burden of the proof should be on the newcomers that safety will be protected."?

MEMBER RAJKUMAR: Certainly, to reinforce that, I guess based on Charles' comments, I think we should push in DSRC as the incumbent federal-level asset, if you will, the licensed owner at this point, right?

VICE CHAIR KLEIN: Uh-hum.

MEMBER RAJKUMAR: Because the incumbent has proceeded into the policy process, right? There are exceptions. That is one. And secondly, maybe sharing will happen in some form or the other. We should put forth there are some ways by which DSRC could be shared with 802.11ac, they detecting 802.11p, I guess, DSRC packets around, and then, backing up using Dynamic Frequency Selection. So, probable solutions for sharing.

MEMBER McCORMICK: I think we have a letter which Scott sent out that says, "We don't think you ought to do it." And then, I think we have a second memo that is internal that says, "Look, in the possibility that we might now win, here are things that we think you should be doing in the background to figure out if it works or encourage industry to do," et cetera, et cetera. I think putting it in -- here is a letter that says you shouldn't do this, but if you ignore me or I lose, is the wrong message to send.

VICE CHAIR KLEIN: It is a little bit rhetorical strategy.
MEMBER McCORMICK: Yes.

VICE CHAIR KLEIN: Do you say no sharing, knowing that if it doesn't work, there is a backup, okay, share effectively? Or do we upfront say, "Listen, we think the no-sharing position is lost."?

MEMBER HAMMOND: Do we know for sure that sharing is going to be a problem?

VICE CHAIR KLEIN: No, we don't.

MEMBER BERG: It is not our job to find solutions. Okay? So, I think more studies, you can advise for more studies, whatever. That is just going to push things out farther and farther and farther. But soon, it won't matter because you won't be using this spectrum anyway. So, you have to be really careful about how you couch that argument if you want to lead to deployment.

MEMBER HAMMOND: But we don't want to say the sky is falling if we aren't sure that we can't share the spectrum, right?

VICE CHAIR KLEIN: Say that again?

MEMBER HAMMOND: Well, to say no sharing, don't we have to back that up with some evidence that sharing is bad? Or do we just look like another group that says, "We want it our way."?

VICE CHAIR KLEIN: Like in a burden-of-proof question, if we put the burden of proof on the other guy, they have to do the studies; they have to do it then.

MEMBER CALABRESE: I was all in favor of charging the White House this afternoon, until I asked Charles the question, "Can we do both?" And he said yes.

MEMBER HAMMOND: Yes, that is what I --

MEMBER BERG: He doesn't know that answer, though.
MEMBER CALABRESE: But if you have someone at that position saying, "Yes, you can do both," the question is over.

CHAIR DENARO: What do you mean by both?

MEMBER HAMMOND: Share.

MEMBER CALABRESE: Can you share and preserve what we need for safety?

MEMBER HAMMOND: Yes.

MEMBER CALABRESE: I mean, if somebody at that position says, "Yes, we could do both," --

MEMBER HAMMOND: Yes, I heard him say that, too.

MEMBER CALABRESE: -- there is no argument.

VICE CHAIR KLEIN: But that is an engineering question at the end of the day, deep engineering.

MEMBER McCORMICK: Yes. He qualified it.

VICE CHAIR KLEIN: I think nobody knows yet.

MEMBER McCORMICK: He qualified it by saying, "We don't know what the quality of service degradation" --

MEMBER BERG: His organization put forth that two-year study plan to determine that answer. I don't know how he can stand up there and say it.

MEMBER HAMMOND: I heard him say it.

MEMBER CALABRESE: That is why I asked.

MEMBER STEENMAN: We all know where the winds are blow politically, right, sharing? It is like pretty clear.
MEMBER HAMMOND: I think we should hit the safety issue loud and strong, our concern for safety, not sharing.

CHAIR DENARO: I think another possibility, instead of worrying about whether we are going to say no sharing or sharing, maybe we should focus on the mission, which is to say it is absolutely crucial for the following reasons, for safety, that there be zero impact on latency, yada, yada. And then, in your work with this, we think you have got to go a lot farther in terms of your investigation to prove that this is not going to impact.

So, the only position we are taking is you damned well better not impact the primary safety function. And then, we go on with some specifics of where there might be vulnerabilities that we don't think you are necessarily looking at. When we talked with Walt, we heard some of those. You know, there is a power thing. There is the interference thing. There is the unlicensed guys. There is the rogue thing. You know, point out all those things.

So, maybe if we just delineate a number of these threats and say, "Our position is we think the public needs to see answers to all of these things that are irrefutable," then we have kind of shifted the burden, like you said, Hans, but we have said it in kind of a requirements fashion.

VICE CHAIR KLEIN: Everybody likes sharing, but let's be sure we have the safety first.

CHAIR DENARO: Well, I am not even saying I don't think we should take the position that we acknowledge sharing is okay because kind of what I am saying is, unless you can prove these following things, you can't share. But we are not going to say it that way. So, we don't get cast into this bucket over here: oh, these are the non-share guys; forget about them.

I am not communicating well, but do you see where I am coming from?

(Laughter.)
VICE CHAIR KLEIN: I mean, until the burden of proof has been satisfied, there should be no sharing. That is one way of phrasing it. Another one is to say sharing is okay, conditional to the burden of proof being satisfied. So, you are sort of saying, until the burden of proof is satisfied, no sharing. So, that way, we avoid conceding sharing upfront.

CHAIR DENARO: I am not even sure if we say that explicitly, you know. I am saying we know that sharing is an issue, and so forth. You have got to make your decisions. Let us just point out the kind of things that need to be nailed shut. You draw your conclusion whether you can share under those conditions or not.

MEMBER BELCHER: Let me just ask a question on that, because I think that makes sense, but the variation I would say is that NHTSA is supposed to make a decision at the end of the year on whether to move forward with a requirement for DSRC in new vehicles. If it not clear where the burden lies, and if it is not clear that sharing will only be allowed if it doesn't impinge on safety, then NHTSA is going to delay its decision until that is clear.

VICE CHAIR KLEIN: Well, we can't speak for NHTSA, though.

MEMBER BELCHER: No, we can't speak for NHTSA, but we do know that NHTSA is not going to do a rule that is going to put the automotive manufacturers in liability, in a liability perspective.

MEMBER McCORMICK: NHTSA may end up delaying, depending on who the new Secretary is. I mean, we have already had those discussions. They don't know if they are going to maintain that schedule, unfortunately, anyway.

VICE CHAIR KLEIN: Right, but NHTSA -- I mean, I can't speak for NHTSA -- but whether or not they would begin a procedure to consider a technology that is itself no longer even
necessarily available, I would be surprised if NHTSA moved forward, given the uncertainty of the very technology itself. It almost seems that NHTSA would have no choice but to wait until we know whether or not we get DSRC before they can begin their own rule. That would be my guess.

I don't know if anyone has heard.

MEMBER STEENMAN: It makes logical sense.

(Laughter.)

VICE CHAIR KLEIN: It makes logical sense, but we are dealing with a policy process, of course.

(Laughter.)

MEMBER KISSINGER: Someone this morning said, I think, that it would make a big difference if the rule was in place now, if NHTSA was mandating it now.

VICE CHAIR KLEIN: Yes. Absolutely.

MEMBER KISSINGER: So, can we lead this letter, if the group is interested, with explaining who we are and that we are a pretty decent cross-section of the stakeholders, and we are very strongly going to recommend to DOT that they proceed with the rule? Which sort of shifts the whole focus. You know, it makes it a little bit more certain than maybe --

MEMBER McCORMICK: Why don't we just do that letter also? I mean, why does it have to be commingled with this issue?

MEMBER KISSINGER: I think we are going to do the letter to NHTSA. I am just saying the letter to the FCC, or whoever we are writing here, that we want to work that in here.

MEMBER McCORMICK: Oh, I see what you are saying.

CHAIR DENARO: What we said earlier is, because of the responsibility of this
Committee, we are going to submit this to our normal channel. It is going to be directed at potentially FCC or NTIA, or whatever, but we are going to go through our channel.

MEMBER BELCHER: Actually, we have got an expert here in terms of how NHTSA works as it relates to safety.

Steve, can you talk about the black-box experience that you guys had and how you think this plays, what you think the Committee should do, because this is your world?

MEMBER KENNER: Well, yes. So, first of all, let me say -- and I know John is not here -- but I think generally we would have the opinion, if somebody said to us that, "Hey, we did some testing and determined," let's just say, "sharing is okay and it provides no risk," I would suggest that we would want to do our own testing to confirm whether that was, in fact, the case, especially since the burden of a system that isn't operating properly will most likely fall on the automakers.

So, I would also suggest that, while we can say it is not ours to prove, it is because we are the ones that are most at risk if the results of that study aren't true, we would have a strong incentive to ensure that that was the case.

So, I get back to the comment I made earlier today, which is I think included in our recommendation should be that we encourage, through CAMP, the Crash Avoidance Metric Partnership, that is partly funded by the DOT and has a collaboration of automakers working together precompetitively on vehicle-to-vehicle, to then ask them to request the CAMP team to do this study and to involve some of the partners in wireless to participate with them, and then, be able to come up with a plan to be able to assess the understanding of what the risks are to sharing or if there is a way to share or not.
And then, that will either generate the data that says it is a big risk and you can't do it or, if
this would be the requirements, if there was sharing, then it would be based on the engineering
experts in each of the industries and based on data generated from such a study.

VICE CHAIR KLEIN: Is this already happening in some way? Because NTIA is
taking -- and, Walt, this may come back to you -- NTIA is taking technical input as part of its
process. And they kept saying DOT supply this and DOT supply that. They seemed to put a big
burden on DOT in terms of doing a lot of engineering.

Is that happening right now? Or maybe Ken? I don't know.

MEMBER KENNER: Well, at this point, I know that at least in some of the recent
discussions, I think there had been some inquiries that the CAMP team was, let's say, reaching out
to other industries to try to get an understanding, but that is different than actually doing a research
project to be able to come up with some specific answers and recommendations.

So, I think there is some discussion ongoing, but I am unfamiliar with, let's say, a
comprehensive study that was done to be able to definitively answer the question. And so, that is
why I think part of the recommendation has to be to do that and commission the team to do that
research.

VICE CHAIR KLEIN: And this is a recommendation going to U.S. DOT. It is not in an
FCC memo. It is in a DOT memo, assuming we are talking about two memos.

MEMBER KENNER: Yes, I am not sure what the best way is, one or two, but I think
that should be part of the recommendation because, again, it should be a data-driven decision.
Right now, you hear people that have opinions, and maybe they have the background and
experience to make a strongly-educated opinion based on past experience, but it is certainly not
based on data from a study of this specific issue.

MEMBER BERG: Steve makes a good point that it should be both sides of the fence working together, because one side or the other, somebody will say, "Aw, I don't like the way they did that" or "I don't like the way power companies did that." "I don't like the way...."

So, we are going to retest it, anyway. So, I think this is a really good suggestion by Steve, to have those two sides of the fence collaborate.

VICE CHAIR KLEIN: The two sides being the automakers --

MEMBER BERG: And the wifi people.

MEMBER KENNER: Yes, it has got to be jointly done, right? Like I said, there might be some reaching-out already there, but I think that should be the recommendation, right? It is that both work together. We are not unfamiliar partners, as you can imagine. So, I think it is a natural thing to do.

But the engineer in me just says that I want to make any sort of policy decisions and recommendations based on data, data generated in a way that both sides can agree with whatever the consequences are of the study.

VICE CHAIR KLEIN: I mean, there is a feasibility question. If RLAN, the wifi community might think that they have more strength at the political level; therefore, they might not want to do a study at this point. I don't know.

MEMBER KENNER: It is possible, yes. But, again, we are partners in other things, right?

MEMBER BERG: This Committee should make that recommendation anyhow.

Whether it happens or not, I think that is a really good recommendation from this Committee.
VICE CHAIR KLEIN:  Walt?

MR. FEHR:  I was just going to suggest that that is not just the auto industry concern. There are other industries that make use of data, DSRC, and they should be included. The tolling industry is one of them. They have a slightly different interest, slightly different uses, but it is similar to the auto industry.

VICE CHAIR KLEIN:  So, it might be in sort of a joint stakeholders' technical report by the combined --

MEMBER McCORMICK:  Well, let me ask a question on that. It is easy to engage the CAMP people, I mean the CAMP people, because we can sit there and go, "Okay, do you both think this is a good idea to study?" How do we engage your side?

MEMBER SCHROMSKY:  It is interesting. I mean, obviously, we are getting into this space, right, with certain acquisitions we have done recently. We have worked with all of the automobile companies, all similar to, I think, a board, right? You have a huge range of Microsoft.

So, I mean, I think this is just -- you know, we sit on different boards or whatever it may be. So, I mean, we are willing to work with anybody.

Back to everybody asked earlier today what M2M, right? That is the future for this industry. It is not cell phones. Smartphones are really great, but it is literally internet things that we are most concerned on them.

Traditionally, the issue that has come with automotive, some aspect of who owns that customer experience with some of the issues to battle between a carrier or Ford or GM or if it is Google or if it is Microsoft, right? So, there are some things that make sense to work together on.

There are some things that there are competitive issues that they battle for. I mean, they don't
necessarily work well together, right?

So, the bottom line is, yes, we will work if it makes sense.

MEMBER KENNER:  But I think specifically, what would be the technical consortium in your industry that would be the appropriate, let's say, interface with a technical consortium of the automotive researchers that are currently working on vehicle-to-vehicle?

CHAIR DENARO:  Is it the other NTIA?

MEMBER McCORMICK:  It would be TIA, I would guess.  I mean, TIA has TR-48 subcommittees, TR-50 subcommittees.  They are specifically reviewing on that, that have all the right entities involved.

MEMBER BELCHER:  One possibility is that we have been talking with DOT about establishing an equivalent of CAMP for vehicle-to-infrastructure convert, precompetitive research like they have done in CAMP.  If DOT does that, that might be the right forum to do it because, then, you could get to the other stakeholders, the Verizons and, then, the infrastructure stakeholders, the toll authorities, and the infrastructure --

MEMBER McCORMICK:  What is the likelihood that that would occur in a timely manner?

MEMBER BELCHER:  You know, I don't know.  Hopefully, it is better than zero.

(Laughter.)

MEMBER McCORMICK:  You know, that ought to be part of the recommendation.

Since you have already tabled the idea with them, even though it might not occur in a timely fashion, there is nothing wrong with reinforcing that recommendation.

MEMBER McCORMICK:  It might be that a joint study group gives rise to --
MEMBER BELCHER: To at least have a vehicle-to-infrastructure group similar to the VII consortium.

MEMBER KENNER: But, really, to be clear, though, because maybe some people are less familiar with how it is set up, right now, there is the CAMP, which is the Crash Avoidance Metric Partnership. That is the technical side that has all the engineers trying to figure out how to develop the applications. The VIIC side is really the policy side that is talking through security, the liability problems.

And so, at this point, it isn't really a policy question; it is a technical question, from which we can make policy conclusions, but we need that technical, let's say, support and answer.

And I think most of us would agree that, if you were talking about, then, that relationship between the wifi wireless groups and, then, the automakers that are currently developing it, the main crux of the question is, can you share the spectrum without jeopardizing the specifics of the safety applications vehicle-to-vehicle.

If on the tolling side or some of the other ones or mobility, like they are doing in Europe, you know, if there is a bigger traffic jam because it didn't work right or you didn't get a collection of a toll because it didn't work right, that isn't the same because it is unlikely that you would need DSRC for any of the other applications, other than safety. It is really the safety application that derives DSRC.

So, we might want to just make sure it is focused and, then, does that. But I think that joint work would be really important.

And that is why I was asking him, in particular, who is doing what by when in terms of the studies? The way he answered that question wasn't as comprehensive as I was hoping for.
MEMBER McCORMICK: I don't think anyone is doing the studies.

MEMBER KENNER: Yes.

MEMBER McCORMICK: I really don't think there is anyone that is actually actively doing the studies, certainly not under federal purview.

MEMBER KENNER: Right. Right.

CHAIR DENARO: So, I really like this approach of there needs to be a data-driven decision. I think I would like us to maybe put it that way and make sure it is data-driven.

But, to Steve's point, how do we express our feeling that the threshold or a passing grade needs to be set really high? In other words, the testing has to be extremely thorough to pass.

MEMBER McCORMICK: I think the way to do that is to make it very simple to digest, which is to explain what the real-time benefits of the DSRC communication is, right? Because that is, then, illustrative of the fact that you are saving lives, reducing crashes.

If you dig too much into the technical details, people will glaze over and stop reading.

MEMBER STEENMAN: We also need to be careful not to overextend our position, right? Because, as we all know, wireless is inherently unreliable. And so, you are going to miss messages, right, whether there is interference or not? Because we lose credibility if we overextend our position.

MEMBER McCORMICK: But if I am not able to transmit them because the spectrum is being hogged by --

VICE CHAIR KLEIN: Yes, but a human life implies a high threshold, if we emphasize the safety benefit.

MEMBER STEENMAN: Yes.
VICE CHAIR KLEIN: The threshold should be appropriate, correspondingly appropriate, to the stakes of a human life.

George?

MEMBER WEBB: Thank you.

I don't know if this a Walt question or anybody else in the room, but when I am hearing this stuff, I am trying to put the pieces together, as in, is it technically feasible? The answer may be yes. But if, in fact, it is on a priority basis, my question is one on scalability. Has there been enough study and evaluation done to know, if we had this system for DSRC out there, and you have got all this thing feeding in, if those were always priority, was there any room possible -- is it 1 percent or one-half percent -- to share whatever is left over after the DSRC priority messages are handled within the bandwidth?

So, I am just trying to understand that, you know, well, sure, you can make it technically feasible that, for that one-half of 1 percent of the time, you could get that little piece of bandwidth, but is it worthwhile? I mean, is it economically feasible, if that is all you are going to be able to use over a given period of time?

And I don't know what tests have been done on the scalability as far as estimates of the availability or use of the DSRC bandwidth.

MEMBER KENNER: Well, I think the short answer -- and, John, correct me if I am wrong -- but if it was dedicated, right, I think we have done a fair amount of work that gives us cause for optimism that it can work. And the model deployment in Ann Arbor is continuing to build that experience and, again, generate the data, so that we can understand exactly how it is going. But, so far, cause for optimism.
As soon as you start talking about the sharing, then that is why I am suggesting that we go back and say we want to have the technical auto experts and the technical wireless experts come together to devise what is required to be able to answer the question you just asked. I don't think anyone can answer that one.

MEMBER WEBB: But I think I just heard you; you are cautiously optimistic that a fully-dedicated area might be okay.

MEMBER KENNER: Right.

(Laughter.)

MEMBER WEBB: But we are not even sure of that. And so, now we are talking about --

MEMBER CAPP: These are the questions in this whole space that have been answered up until now in the dedicated space. So, experiments like the safety pilot will help build everybody's confidence and, hopefully, address that question that, yes, this will work if dedicated. Security, the NHTSA folks talked about that. They are finally adopting some of the security piece. We have made some good progress on defining some of those steps.

Privacy, a little more complicated, but some progress being made.

And all of a sudden, this question comes up, "Well, what if it is not dedicated?" All right? All right, then we want to be data-driven. Some of us are engineers; we love to be data-driven. It is the right thing to do.

The problem with data-driven is we could start another 10-year process of hand-wringing and, boy, we are not sure and what data is going to take. A study takes this long. I'll tell you what? We will just do full studies. It will take three years.
We have to think as an Advisory Committee, I think, about does the DOT have the time to study too many options. I think it is a fact of how is this thing playing politically. I don't understand the politics. I have learned a lot today. It was interesting.

(Laughter.)

But it is real, and we have to factor that in. Because by the time we get our answers, it may be too late. I don't know what we do with that, but we need to think about that.

MEMBER SCHROMSKY: You bring up a good point. I mean, one of the things, my background, I am hearing priority. You know, kick somebody off. Who sets that stack, right, if it is not dedicated? And my first question would be, if it is not dedicated, who is the governing body that sets the priority levels, right?

I mean, traditionally, we deal with this in public safety all the time, right? They want ability on our network to possibly kick off a citizen, right? Well, we don't set that body, right? NCS does that under DHS and sets the priority level 1 through 5. And they wait until the next available cue to get on the network. We don't kick somebody off the network.

So, when I start hearing "non-dedicated priority," my first thing that comes to mind is, okay, who sets the priority? Who governs that priority? And if you are talking about, similar to the automotive, right, there is a handful of cellular carriers, it is a little bit easier. But if I am getting to multiple devices, multiple manufacturers, that is a much bigger problem that you are trying to undertake that says, okay, you get this level. Who is going to own that, right? That is a big problem, I think.

MEMBER CAPP: And if they are moving -- and it was a little bit unclear -- but if they are moving on a one-to-two-year regulatory timeframe, it kind of sounded like, there are going to be
limits to what kind of answers we will be able to get in that timeframe, to be realistic about getting those answers. Is that correct?

MEMBER STEENMAN: Well, to put a bit of fuel on your fire, I mean, we are probably going to do what the RLAN industry will do at some point, right? They said, okay, look at the timeline of this. People might have critical mass in the market by 2020. By that time, we have already moved on five times now by our standards. "So, why are you guys like bothering me?"

(Laughter.)

MEMBER CAPP: Yes. That is right. You may get zero.

VICE CHAIR KLEIN: Our LAN is a radio LAN. I had to look up that term. It is like wifi, RLAN, kind of the same thing really.

MEMBER KIRBY: You know, it seems to me that we have got to make a case right now. You have to make a case that potential benefits in the outyears of safety are very substantial. We have already got proven technology with tests that are working. And that, for the moment, this frequency has to be protected, so it can be dedicated. And that is the default position. And until someone shows that it can work in a shared mode, it needs to be protected. I think you just have to take that position because, otherwise, you are going to potentially lose the whole thing.

As soon as you open the door to its not being protected, you are into all these questions about, "Well, how could that...?" and "Let's demonstrate whether it can be or can't be," and you are looking at years of study and all the rest of it. You really can't define a position that you can hold at that point.

MEMBER McCORMICK: I like that because it answers your statement that says we have got to tell them something now. We could put in a recommendation that says, you know,
these decisions should be data-driven, and until they are, the spectrum should be protected.

VICE CHAIR KLEIN: The stakes are high, human life.

MEMBER McCORMICK: Right. Yes.

VICE CHAIR KLEIN: Therefore, the decision must be made carefully, should be data-driven, and let's get the data-driven before we make any decision about taking away --

MEMBER BERG: Put that in first, and then, say, if you have data that supports the sharing, then go ahead -- afterwards, after you have made that, see. Otherwise, you are never going to reach it. Protect the spectrum --

VICE CHAIR KLEIN: These are some of the points, but sort of order it: stakes are high. They must be data-driven. And the key element is that no sharing until --

MEMBER KIRBY: In order to preserve the potential benefits, safety benefits, this frequency must be protected until such time as someone can demonstrate that sharing is possible. And the burden, then, for the studies is to show that sharing is possible. But, until that is shown, protect it, and it gets protected for 10 years.

MEMBER KISSINGER: Yes, I mean, I think you make the point that our recommendation is data-driven, the current data. Don't open it up like -- this idea of opening it up to more study, I think that is --

CHAIR DENARO: The other advantage of that is that gives you time to potentially to get more model deployments in the field, which, then, become test beds for that. So, those you are both testing theoretically or in the laboratory as well as in the field. And again, you have a more robust that it can be shared. And so, that is a pretty good --

VICE CHAIR KLEIN: And, George --
MEMBER WEBB: I just want to take exception and just offer, instead of "Sharing is possible," say, "Sharing is feasible," because there is a big difference in the two. You know, when you talk about setting the priorities, and so forth, like that, whether they are feasible or not versus the technical, yes, it is possible to share.

CHAIR DENARO: Just for the process here, by the way, what we will do is we will get some volunteers to write this thing, whatever it is going to be, or a combination. We will get a draft, and then, we will pass that through all of us. Everyone gets a chance to tweak, or whatever. And we basically come up with a final document. We will have a chance to wordsmith and whatever else.

But it would be good for us to at least today arrive at the fundamental principles that we are going to put in this thing.

VICE CHAIR KLEIN: We outline important bullet points and maybe get a few volunteers who will address certain points and put it together, and then, circulate it.

Steve?

MEMBER ALBERT: One of the things we heard earlier, I think, heard from someone, was that 90 percent of the people who tried these systems in cars liked them and would use them. And I am wondering if some statistic like that, that could be spun to show that there is public support, the public being a constituent group, be as one of the bullet points up there.

Initial findings have found 90 percent of the people want to have this type of device in their car.

MEMBER HAMMOND: Do we know that for sure? Do we have some kind of data?

MEMBER KENNER: Yes. Dan mentioned, when he did his presentation, that they
did a bunch of driver clinics. I can't remember how many cities, but there was -- six? They had
different age groups and genders and everything across the six. It was well-designed, and I think
people would recognize the validity of the data from this group.

VICE CHAIR KLEIN: I mean, the evidence, we will cite that it is data-driven; there is
evidence on how likable it is.

There is evidence on potential benefits. I mean, Bot, I talked to John Maddox about the
benefits and exactly what that study was that showed the 80 percent number. I mean, if you go up
to that 80 percent number with a fine-toothed comb, like many of these benefit studies, it is
potential data.

Ron? I'm sorry, Ron.

MEMBER KIRBY: Yes, I think, rather than say, "Stakes are high" -- that doesn't mean
much to anybody -- that needs to be substituted with a statement about potential benefits and this
potential public acceptability.

We know there is a lot of vehicle accidents that could be prevented with this kind of
technology and lives could be saved. That is an assertion. That is why we are doing all of this.

We have also determined through surveys that the public is interested in this. So, that is
another big part of the -- I mean, not only this work, but people like it and they are willing to do it.
That becomes the umbrella as to why we think this needs to be protected, because those benefits
and the acceptability are there, and we have got tests out there that show this works. And so, we
need to protect this spectrum.

MEMBER CAPP: Also, the fact that NHTSA is prepared to move now.

MEMBER KIRBY: Right. And there is a rulemaking under consideration.
MEMBER CAPP: So, if all this up in the air, they have to take a step back and everybody loses the benefit of contraction that is finally starting to occur.

VICE CHAIR KLEIN: I mean, it might be, well, the point, this maybe gets filed under the category of political, but if NHTSA actually jump-starts and is already active in it, then it might be harder. Your incumbency is, therefore, that much greater. But that is NHTSA decision. Scott? I'm sorry.

MEMBER BELCHER: So, I think this letter is good. I think we need to have something that addresses timing and urgency with respect to deployment. Because Ton's comment earlier and Charles' comment is exactly the right one.

So, you have got the companies that want this at FCC and at NTIA on a daily basis saying, "If you open it up, we are going to create this much new GDP, this many new jobs, and we can do it now."

You are talking to an industry that has been sitting on the spectrum for 12 years, and they are not going to deploy for, even if you take them at their best-case scenario, we are not going to see deployment for another five or six years and full deployment for another 15 years. You know, that just doesn't make any sense.

And you can see the FCC saying, "Well, yeah, it doesn't make any sense. Let's get it out there, and then figure out how to make this happen."

And so, I think one of the biggest challenges that we have got, I mean, I think this group can write this letter and can say, "No way, no how," because of this. And it is an appropriate function. But I think the bigger question is, how do we expedite the deployment? Because that is going to ultimately be, I think, part of what saves the day, if the day is to be saved.
VICE CHAIR KLEIN: Yes, although I think our numbers on deployment, five years --

MEMBER BELCHER: I see the numbers.

VICE CHAIR KLEIN: I am not sure that is going to change the parameter. The deployment schedule somewhat is what it is, I think.

MEMBER BELCHER: Not if there is an aftermarket deployment scenario. Then, it can happen much, much more quickly.

VICE CHAIR KLEIN: Walt, jump into the commenting.

MR. FEHR: I just wanted to remind that vehicle-to-vehicle crash avoidance isn't the only application for this particular communication technology, and there may actually be some valuable deployments that actually place much sooner, maybe even as soon as next year, from what we have been able to see. Much, much smaller scale, but still very useful deployments of this technology.

So, just keep that in mind, that there are other users besides using it for crash avoidance that are starting to put together business plans and are beginning to depend on the availability of this.

MEMBER BELCHER: Is that such as in the toll industry and the freight industry?

VICE CHAIR KLEIN: And those are tolling, commercial vehicles operations mainly, commercial vehicle enforcement activities are the ones we have seen.

MEMBER STEENMAN: Yes, to that point, it might be useful to really point out the economic benefit that this is going to derive; first, the social benefit in saving human lives, and things like that. Because the wifi industry will largely make an economic benefit argument.

MEMBER SCHROMSKY: GPS, the same way, right?

MEMBER STEENMAN: Right.
MEMBER SCHROMSKY: I mean, you open it up, and then, you add the aftermarket.

MEMBER STEENMAN: Yes.

MEMBER SCHROMSKY: And then, you add the OEM.

MEMBER STEENMAN: Yes.

MEMBER SCHROMSKY: And it just explodes, right?

MEMBER STEENMAN: Right.

VICE CHAIR KLEIN: Joe, you had your hand up.

MEMBER CALABRESE: Well, I did, but just a suggestion. If we are going to talk about the importance of safety, we have got to talk about the number of fatalities. What is the bogey? The bogey is we will reduce this number of fatalities, assuming that information is available.

VICE CHAIR KLEIN: Yes, uh-hum.

MEMBER CALABRESE: So, we have got to put the blood and guts in the water.

(Laughter.)

VICE CHAIR KLEIN: I think, you know, I kind of predicted this upfront. I think we have got a pretty fast consensus. I think we have got excellent points here.

We might get a little ahead of our schedule if we would almost start to make closure on this, take our quick break.

Heads-up to Ken; that might move you forward, if that was okay with you. Because, then, we might be able to discuss the issues you are raising, which I would like to do.

So, does anybody want to volunteer -- and I will put myself first -- a subcommittee to draft this memo here? Scott, yes; Roger, yes. Automakers? Steve?
MEMBER CAPP: Yes, I will volunteer.

VICE CHAIR KLEIN: Are there any other key players? That is a good team. I am happy to be the editor-in-chief on this one to kind of facilitate it, and I can step up.

I am guessing this will run a couple of pages.

Now let me think for a minute. If we target the process here, this goes through the chain of command at DOT before ultimately going -- if our ultimate target is FCC, what exactly is our --

MEMBER BERG: I am not sure the ultimate target is FCC. I think it is the Administrator.

MEMBER McCORMICK: Yes, I think the Administrator can use it as he sees fit and appropriate to carry through. That would be the most appropriate way for us, as opposed to us sending it to the FCC.

VICE CHAIR KLEIN: Okay. So, the Administrator. So, normal channels and going through normal destinations, and then it can be --

MEMBER STEENMAN: Yes, "Here is a brief document that you can use in your discussions with the FCC and the White House, whatever, everybody you talk to."

MEMBER BELCHER: What committee has oversight of this group?

VICE CHAIR KLEIN: Bob, I think that question was for you.

CHAIR DENARO: I didn't hear it.

MEMBER BELCHER: What congressional committee has oversight of this Advisory Committee?

CHAIR DENARO: It is under FACA.

VICE CHAIR KLEIN: Advice memos go to the Hill on an annual basis.
CHAIR DENARO: It goes to the Secretary, the DOT Secretary. We write the report for him that goes to Congress summarizing, you know, including what you have recommended.

MEMBER BELCHER: And he sends it to the majority --

CHAIR DENARO: Yes, it goes to the Speaker and the --

VICE CHAIR KLEIN: No, it goes to Congress as a whole, not to the Committee.

CHAIR DENARO: Correct.

VICE CHAIR KLEIN: Okay.

MEMBER RAJKUMAR: Hans, just to be sure, the letter from the Subcommittee would report back to the full Committee?

VICE CHAIR KLEIN: Yes.

MEMBER RAJKUMAR: Everybody gets to see it?

CHAIR DENARO: Oh, absolutely.

VICE CHAIR KLEIN: Oh, yes, yes, yes. We will do the usual circulation thing. Either Bob or I will do the --

CHAIR DENARO: One thing I should say is that a little bit time is of the essence on this thing.

VICE CHAIR KLEIN: That is why my take was like, oh, boy, we had better hurry up on this. So, I would say let's try to get this out rather quickly. Okay.

Any other comments?

(No response.)

So, I think we have got our action cut out for us.

If the drafting plan wants to meet over a glass of water right now, that might be -- since
time is of the essence.

(Laughter.)

Now, yes, Steven, the announcement that you said was dinner tonight.

MR. GLASSCOCK: A show of hands for dinner.

VICE CHAIR KLEIN: A show of hands for dinner tonight.

MR. GLASSCOCK: McCormick & Schmick's.

VICE CHAIR KLEIN: At what time?

MR. GLASSCOCK: Six o'clock.

VICE CHAIR KLEIN: Six o'clock, dinner tonight. Those of you who will attend the dinner and go out with the group?

(Show of hands.)

MR. GLASSCOCK: Okay.

VICE CHAIR KLEIN: How many did you get?

MR. GLASSCOCK: Six.

VICE CHAIR KLEIN: Six hands?

MR. GLASSCOCK: Six hands.

MEMBER CALABRESE: Is that the one on K Street? Where it is?

MR. GLASSCOCK: McCormick & Schmick's.

VICE CHAIR KLEIN: Okay. Dinner tonight, McCormick & Schmick. You are going to love it. Great food, great company. So, everybody who can make it raise your hand. We will do another count.

(Show of hands.)
Well, there you go. That is a lot better. Team spirit.

Okay. We are now going to take -- we took a break a little while ago. We will take a short break now. Let's make it about 10 minutes or so. Does anybody really need a break? So, 3:24, about I will start hollering at 3:35, and I am sure we will start shortly thereafter.

(Whereupon, the foregoing matter went off the record at 3:24 p.m. and went back on the record at 3:40 p.m.)

REQUEST FOR ADVICE: KEN LEONARD

VICE CHAIR KLEIN: Okay. We are going to start. Now we are back on the record or we are soon about to be back on the record.

And we have incredibly -- what committee gains time on its schedule, particularly having, I thought, rather productively addressed an action item just earlier.

But we are going to talk now, the last item on our agenda, request for advice, looking at the report to Congress, the Strategic Plan, deployment implementation, and so on, issues that are important to open and that I think you can have a good discussion on as well as learning from.

So, without further ado, Ken Leonard.

MR. LEONARD: Well, as I said to Bob yesterday, what is the point in having an Advisory Committee if you don't ask them for advice from time to time?

(Laughter.)

So, I have four topics where Congress has actually asked the Joint Program Office for advice or at least for reports. So, these are things I have to deliver, my office has to deliver, back to Congress. I thought, well, who better to ask to help me with that process and to get input from than a congressionally-established Advisory Committee?
The first one -- and I think the first two will go fairly quickly, and the second two we could probably spend a day on each -- but the first one is the report to Congress, which I have already gotten the observations that were issued by the report. I think it was mentioned earlier this morning that we have sent those up the chain. Greg Winfree has signed off on them, and they are on their way up to the Secretary's Office.

If timeframes hold true to past history, within four to six weeks, the observations that you provided will be submitted to Congress. Now I am not chastising anybody. I have to get those into Congress by February 1st. So, I think I got them from you the middle of February. But we do have to explain that to Congress. And we have. We just said we couldn't submit what we didn't have, and sent that forward.

I understand, though, from reading the observations, that you will probably be providing some specific recommendations next year at the conclusion of the chartered period for this Advisory Committee, in the December timeframe. And so, I am looking forward to that because I would like to try to submit those to Congress.

Specifically, if there are recommendations, our office has to develop a response to each of the recommendations. The observations were a lot easier to comment on. We said, "Well, we like the observations. They are interesting. We are considering them."

And, in fact, I read that report. I have actually got one of my staff turning it into a briefing because I think it actually makes for a good story that I will probably take out periodically and say, "Well, these are the observations of a group of very bright, involved people," and share them with some of the stakeholder groups that I talk to. So, I really appreciate that because I appreciate your time and input.
But, for the report to Congress, which will be due February 1st, 2014, really the next deliverable I have to give to Congress, I would really look to get those from you in the December timeframe, so that we would have time to explain to Congress how we plan to deal with each of your recommendations. And not knowing what they will be or how specific they will be, that gives us a little time over the holiday break to develop some recommendations and a story for Congress.

And that is kind of a non-controversial "ask" because you have been doing that in the past, and I am sure you will be doing it, you are already planning on doing that one. So, I don't think there is any real need for a lot of discussion.

I did just want to thank you, though, for the observations. As I say, it was a good read, and I think it tells a good story. I am going to try to take it on the road at some point and share your insights with others in the community.

The second item is the Strategic Plan. This is a process that we have started. We have to produce a Strategic Plan every five years. As you know, the Program Office has been executing a Strategic Plan that was created really three years ago. We are in the last two years of a five-year Strategic Plan.

When that Strategic Plan was created, I don't think it really envisioned the safety pilot. And so, I give it credit for having been a flexible Strategic Plan and being able to adapt to technology challenges as they emerged.

CHAIR DENARO: Ken, excuse me. Was that '10 to '14, was that the --

MR. LEONARD: Ten to '14.

CHAIR DENARO: Yes. Okay.
MR. LEONARD: And we will be producing a '15-to-'19 Strategic Plan, and we are in that process. Right now, we are soliciting public comments on IdeaScale, and we are starting to get those. James Pol, who was here earlier, he is heading up our strategic planning process and we are contracting for some support on that.

This will be about a year-long process of just pulling together drafts and outlines. We have some specific themes that we have published and made public. I will tell you what they are. They are really just themes that we have identified as a starting place. We are looking for input on additional themes and areas.

CHAIR DENARO: Just for everybody, those themes were in our read-aheads.

MR. LEONARD: And they are the maturing connected vehicle systems, the piloting, deployment readiness, and integrating with a broader environment.

So, one of the things I would like to do, and probably the next Program Advisory Committee meeting, I would like to devote some time in that next meeting to hearing back specifically from the Committee on the strategic planning process, the strategic planning themes, any suggestions that the Committee would have in the area of strategic planning, without knowing exactly when we are going to set that next meeting. Because we have started the process already, I would like to get your input early, so that you can be involved in the early shaping of the Strategic Plan for 2015 through '19. I think, again, this is a group that I would value the input from. If we get that input at the next meeting, there may even be an additional cycle where we will have some early drafts that you would be able to comment on again.

So that is a more near-term homework assignment, if you will, in terms of an area where I would like you to be thinking about this project between now and the next meeting. I am sure you
have all looked at the Strategic Plan. It was my spinup reference document. Since I had to do a
number of early briefings three weeks on the job, that was what I went to as a document to get
familiar with the work going on in the program.

So, again, if there are any questions about the Strategic Plan or -- sure, go ahead.

MEMBER McCORMICK: I have one question and one suggestion. I don't know when
you are planning on the next meeting here. I did talk to Mike Schagrin last week when I was here
in D.C., and I asked him when they were going to have the annual V2X briefing that JPO puts out.
I did ask him where it was going to be. And he said it was going to be in D.C., and I believe it is
the second week of September.

MR. LEONARD: Oh, September?

MEMBER McCORMICK: So, that might be a useful time to look at coordinating our
other meeting around.

Do you know the exact date, Valerie?

MS. BRIGGS: I don't, but I can probably find out.

MEMBER McCORMICK: Well, yes, somebody knows.

The other thing, having read this document, that I wanted to just kind of table is that
although we have a responsibility to respond to all of the connected vehicle type of activities,
anything that is done in the CV space is complementary -- I won't call it autonomous -- for
automated vehicles, automated vehicle functions, as well as electric hybrids.

And as part of a Strategic Plan, my suggestion would be to consider ensuring that you are
incorporating in the tapestry of all of those things that are going on because of range anxiety,
because of a whole bunch of issues. You know, the electric hybrid is becoming of growing
importance. The adoption is much quicker. And the implementation of automated subsystems in
vehicles is advancing at a faster rate than I think anybody would have forecasted two years ago.

And because all of them need some level of connectivity and cooperation to get to where
we are going to end up going, I would just offer that I think that part of the Strategic Plan, that this
ought to link to those other parts.

MR. LEONARD: Well, let me push a little further than that. I absolutely do not want a
Strategic Plan that is limited just to connected vehicles.

MEMBER McCORMICK: Okay.

MR. LEONARD: This is the ITS Strategic Plan. And so, in that regard, I think it really
needs to encompass the world of ITS activities, not just the connected vehicle activities. And that
is a very broad range of activities.

Now there may be some areas where we identify some strategic areas that we can't
resource during that Strategic Plan, but I think that it is valuable to identify what you are either not
resourced to do, but to recognize that there are things that are going undone.

Not to say that the electric vehicle is an area that should not be funded, but I think I want
to go beyond just the connected vehicle. I think that connected vehicle is a critical focus right now,
and I think it will be critical in terms of deployment activities in the timeframe of a Strategic Plan.

But I also think we need to think about the research that has to go on. So, for example, I
think there is critical research that will have to be going on in the area of autonomous vehicles. I
think the ITS Program Office can support that.

I think there is critical work in the environment and mobility areas that we need to look at.

Things like bicycle ride-share programs should be in there, connected vehicle protection for
pedestrians, and the V2X, you know, handicapped pedestrians, and a whole spectrum of issues.

We had some brief discussion about rail earlier today. I have been trying to engage FMCSA, the pipeline mode, into identifying some areas to work with us and the Federal Motor Carrier Safety Administration on hazardous materials involving intelligence transportation systems.

So, I am a firm believer that there is a lot of research that has to be done yet. I would like to see a Strategic Plan that identifies all of those areas, and then we can discuss the priorities.

MEMBER WEBB: In that case, I would like to add one more "V". You know, we tend to look at V2X as being vehicle-to-infrastructure and vehicle-to-vehicle. If you look at where we were with pneumatic devices 10 years ago versus where we are now, I think the V2X also should include vehicle-to-device, whether that is a personal communication or a computation device or something that is just harvesting information.

Because the definition of whether it is an RSU or an OVU really has to do with whether or not it is moving. If we look at what the evolution of the handsets, the tablets, the other devices are going forward -- and Intel can probably shed more light on this than I can -- the next generation of Galaxy phone has a dual-core 1.5-gigahertz processor and up to 64 gig of RAM. You know, that is more than we had in the first three space shuttles.

At least five, if not more, of the automakers have all looked at tethering those phones to utilize the processing and the fact that you have a carrying transceiver with you, because your car electronics are outdated in about three years, and you will update your own phone.

So, I think there are areas of opportunity that I don't know who is driving my car, but I always know who is using my phone. You know, the ability to harvest information about driver behavior for your own purposes, for insurers, for safety, for providing information back to the
DOTs, all of a sudden, there is a much simpler profile.

MR. LEONARD: By the way, I think when we use V2X, we don't think of it just as V2I and V2V, but also V2M, motorcycles; V2P, pedestrians; V2D for device. Absolutely. I mean, I would like to see my driver's license on this, so that when I get into a car, I drop this into a slot, and particularly if I were a commercial motor vehicle driver, drop that into a slot. It knows whether my medical is current. It knows whether I am within my hours of service.

And if there is a traffic management system that is picking this up at a weigh station in Tennessee and one in Massachusetts and one in California, there is a trooper somewhere saying, "Wait a minute. There aren't three Ken Leonards driving in three different states right now. There is somebody driving on a phony license."

So, there are things that can be done.

Scott, I am going to get you in a minute because I know you have got a comment there.

Dan also mentioned like some day-one benefits that I have been talking to them about. One of them is we talked about work zones earlier. And one of the topics I have discussed was the notion of when a police officer pulls somebody over. That is a work zone. It is a temporary work zone. When somebody is mowing on the side of the road, it is a temporary work zone.

Now, in both of those cases, you may be able to solve the problem with a V2V because you may be able to put a device on the mower or a device in the patrol car. But I do know that about every five weeks a police officer is hit on the side of the road. It is about 10 percent of law enforcement fatalities. And the others are in-vehicle accidents and high-speed pursuits, and things like that, that are an even larger percentage.

But that is a potentially-avoidable problem. And states have passed laws that say you
have to move to the left, but you don't know you have to move to the left until you are over the rise. In a really connected vehicle, it says there is an operation on the side of the road; move left. It doesn't matter whether it is mowing or somebody with a radar gun; you can move to the left.

And so, I think there are things we can do, national deployments that can help in the rural areas as well as in the urban areas, and save lives.

MEMBER McCORMICK: I think it would be really useful if you broadcast for the radar gun locations.

(Laughter.)

VICE CHAIR KLEIN: Scott, thanks for volunteering for being on the Subcommittee.

We are doing the Strategic Plan. I appreciate that.

MR. LEONARD: Scott, did you have a comment?

MEMBER BELCHER: Ken, just two comments. One, you and I have had a number of conversations about how you are interested in pre-deployment research, so not just to help get the technology that is coming through research and get it deployed. I just wondered if you could comment about that.

And then, the second comment, I think one area that I think is absolutely critical is helping -- and it is kind of a deployment scenario as well -- helping to move big data and systems application, because we are not there yet. We are a long way from there.

But we were just at a conference last week on smart parking. The way a number of new startups are using data analytics, it could be the tail that wags the dog. We need to figure out how to get state governments, city governments, transit organizations to start to use data and data analytics to really advance their programs. And so, helping to think through that would be really,
really valuable.

MR. LEONARD: Well, I don't know a lot about the area of big data, except when I think about this program, I think about it as a big data problem. I think it is an area that we need to be doing research for our Strategic Plan because of the potential for business cases, for helping with deployment in utilization of data at all levels from the private sector to the localities and states.

On the issue of pre-deployment research, it is within the scope of the ITS JPO to not only do R&D, but also do technical assistance with deployment. So, I look at something like the safety pilot.

A little digression on my background. While I have been in the R&D community for a long time, one of the things I am happiest about are the R&D projects that I have gotten out of the laboratory and into prototype use and into operational deployment. While I love R&D, R&D that stays in the lab is just fun.

(Laughter.)

I am also an economist. I know the way you change the world is by putting things into productive use. And the whole value here is by getting productive use of ITS systems, whether it is for tolling or whether it is for reducing fatalities, reducing emissions, increasing mobility and traffic throughput. Those are all productivity benefits that raise the wealth of society.

So, okay, that is why I am getting up in the morning and coming to work. That is what excites me about this job.

And in the aviation arena, I was able to do that where we deployed systems that I know are saving lives today. That gives me a good feeling.

I know we can do that here. One of the ways you do that is by putting out prototypes.
Because you can have something in a laboratory and convince people that in theory it works. But, until a user can hold it in their hand, they can use the data, they can make a decision differently in the real world with the information you are giving them than they would have the day before without it, and they can rely on the information you are giving, then you change the world.

And the way that this program office can help with that is by growing prototype deployments, test-bed deployments, pilot programs. Now I don't have the budget nor the staff to manage $100 billion deployment program like the rest of Federal Highways has, but we can do work in test beds and an assortment of arenas that show local communities, show states, show industry partners how to turn ITS theory into practice. And so, those are opportunities that I think we should look for, and they should be a part of our Strategic Plan.

In fact, the Program Office is already working on how to incorporate our work with affiliated test beds and our prototyping activities to get things out of the white-paper stage and into use in environments where people can really assess their value.

MEMBER KIRBY: Just to pick up on that point, you know, I am kind of struck by that there seems to be a little bit of a dichotomy here. You know, Title 3 talks about the intelligent transportation systems research, right, and the ITS Strategic Research Plan we are looking at, right?

But, then, you get into some of the sections from MAP-21 and you see a section "ITS Deployment Incentive". And it says, "The Secretary will administer a competitive grant program to accelerate deployment" and strategies to do all kinds of things, like weather event response management, and all those sorts of things.

Since I have been on this Committee, which is not very long, we have been totally focused on connected vehicles. And that is what your Strategic Plan seems to be totally focused on.
And I guess my question is, where are these other things? Do we get to make input on some of those other areas? Because I can tell you from my experience, you know, as an NPO Director in a three-state NPO, it is devilish hard to get three states to contribute program money to do an innovative project. No offense.

(Laughter.)

So, their money is all programmed. "We're busy." "We are doing all these other things."

"We have got a huge backlog."

You know, how about trying something new? We put together a regional management program in the Washington Region. The only way we got that started was we got an earmark from Congressman Moran, who is not allowed to do that anymore, and we earlier had some ITS discretionary grants that enabled us to do things. That ended up getting programmatic funding on a continuing basis, but getting started, you know, having these discretionary grants to get things started is just terribly important.

And so, I am very intrigued about what potential is there because I think there are a lot of things. You know, weather events, again, a big deal. Whether you believe it is due to climate change or whatever, it is happening. And managing those events, we are focusing a lot of our resources, planning resources as well as programmatic resources, on some of those techniques.

There is a lot of technology, information-sharing, and so forth, that can be really helpful in that regard, and I am sure a lot of other areas could benefit from that, you know, if they had something to kick-start it.

And I am just wondering if there is a sort of proactive effort to activate these grant initiatives for deployment specifically.
MR. LEONARD: Well, before I talk about that, I will do a shameless plug for the American Meteorological Society presentation I am going to give on April 4th about surface weather applications.

(Laughter.)

I used to be the Director of Aviation Weather at the FAA. So, it is an area that I --

MEMBER KIRBY: You can come give us a presentation about that.

(Laughter.)

MR. LEONARD: So, I understand the importance of weather in transportation. One of the points I am going to make in April is 7,000 fatalities on surface transportation occur under adverse weather conditions. So, NTSB tends not to find weather as the primary cause of an accident. Even in aircraft-icing accidents, it is usually listed as a secondary cause, pilot error typically being the first.

And I think it is largely that way in surface transportation. It is driving too fast for conditions. Even 30 miles an hour in fog is too fast sometimes.

So, it is an important area and I think an area that I have been interested in for a number of years. And so, I think it is relevant to intelligent transportation systems.

I also think it is an area where states can make a lot of money, save money, on road treatment. And Paul Pisano in Federal Highways has been running a program for years and years that has been affiliated with this that was an earmark that has worked in that area.

In terms of the grants, well, we are kind of getting into my third "ask". So, I will use this to segue to the third "ask," which is --

CHAIR DENARO: Before you do that, I would just like some clarification, Ken. Your
comments are relating to what we might want to comment on on the next Strategic Plan or our current activities, or both?

MR. LEONARD: Both, but particularly the Strategic Plan. I don't question the importance of connected vehicles. I think this letter that we just agreed is very important. I think that is maybe about as far as we can go as a Committee. We can't get into too much more depth, you know, doing the technical work. But I think we can play a useful role in saying that. We know enough technical stuff to be able to say.

But maybe there are some other areas where we could have a similar kind of exultation and influence of saying, well, there ought to be a focus on these kinds of ITS applications because we are seeing real benefits out there potentially from them, and we see the potential for some discretionary incentive pilot grants, or whatever, to expand the application of some techniques that maybe some areas have been able to apply successfully. Otherwise, it is going to take a long time to be adopted. So, it is just a deployment focus really.

CHAIR DENARO: Right. So, let me just address those two. First of all, back to the Strategic Plan, absolutely, let's think about some comments and get those kinds of considerations in there.

But even in thinking about our current recommendation memo that we are heading toward at the end of the year, one of our Subcommittees, headed up by Hans, is the Market-Driven Adoption Strategy, which is really talking about deployment. I don't know if you ended up signing up for any of those.

MR. LEONARD: I think I am on that Committee.

(Laughter.)
CHAIR DENARO: So, here is exactly what you said can feed through to one of the recommendations that we end up putting in this memo.

MR. LEONARD: Right.

CHAIR DENARO: So, thanks for mentioning that, and that is your path.

MEMBER ALBERT: I am on that Committee, by the way.

CHAIR DENARO: Oh, boy.

MEMBER ALBERT: We have got several members. This is the only time we talk, right?

(Laughter.)

I guess this is for you. You know, I know we would all like to say that we have gotten over the silos of a lot of the solutions, whether they be ITS or institutional silos. But I think one of the things that the incentive program should really focus on is development of better regional servers or fusion models that create this information from the various silos to put them into a regional server, so that better planning, better deployment, better implementation can take place.

I can't remember whether that was in here. I did read it, or the congressional part of this. But it seems that, if you did anything on incentive to get the agencies to work more collaboratively together, and to all see the same data and to see the same picture, it is something that should be really -- it is time to start focusing on that, whether that be a project like we have like Weather Share, that is like Polaris, that fuses all the RWITHs and meso-data from MesoWest and all that.

We need more of that kind of stuff.

And we also need more collaboration between whoever is developing these servers, so that we are not all reinventing the wheel every time we develop one of these big servers. Anyway,
that is happening on a multi-state level, too.

MR. LEONARD: I think there are two parts to this. One, I think these are exactly the kind of ideas I would like to see in our next Strategic Plan. So, please, write them down and bring them.

I mean, you can comment on IdeaScale, but I would like to have a separate set of inputs from the Advisory Committee apart from the public inputs because I think we are going to be doing a number of listening sessions. This is a group I want to listen to. And so, I think these are the kinds of things we need to make part of a more robust ITS program and part of an ITS R&D activity, because I think there is a lot of work that has to be done to explore these things and do them well.

You mentioned deployment grants, and that kind of takes me into the issue of, well, how do we incentivize deployment? And I know there have been activities and there is --

MEMBER ALBERT: And this is your third one, right, Ken?

MR. LEONARD: This is the third issue, which is a third report that I have to give to Congress. And there is no specific date on this from Congress, or at least I haven't found one in MAP-21 saying when this particular one is due.

But it is an issue that has got to be addressed. There are sometimes different camps. The group that says, "Okay, well, you have done great stuff with connected vehicle. Let's stop doing the research and let's move the budget over to deployment, and we don't need R&D anymore."

And I am not a believer in R&D for R&D's sake, but I do believe -- and I know this program has been around for 20 years doing R&D -- I think it will be around for another 20 years doing R&D.

So, I would be hesitant to hear advice -- I would listen to it -- and the argument to say,
"Well, let's just take the money out of R&D and puts it into deployment," because I think that is shortsighted. I think that is eating the seed corn, which is an argument R&D people always make, but I would make that argument.

I think there is just too much, that we can see too bright a future in intelligent transportation systems. I could easily see spending more money than we have. I have a hard time knowing what I would want to do less of in this program. I can identify lots of things, if I had more dollars, I would spend it on, but not a lot I would say, "Well, gee, if we didn't spend that money, we wouldn't miss it."

And I have got six transit projects going on. Transit is coming to me and saying, "We've got more ideas. We would like to do more," and we would like to do more.

So, on the congressional "ask" here for deployment incentives, again, I want to look at this from a very broad perspective. I think there are a whole host of deployment incentives. And the easiest one is, well, give me a $500 billion grant program, and I will just start seeding ITS money all over the world.

That might not go over real well in a Congress that is dealing with budget shortfalls and sequesters. And so, I think that is kind of the easy way out of a deployment incentive, is to just say, "Give me big budgets and we will fund it."

MEMBER McCORMICK: Do the deployment incentives go to the states?

MR. LEONARD: Well, that is what I am hoping you are going to tell me, because I can think of all sorts of deployment incentives. I can think of deployment incentives to help create private sector markets. I can think of intellectual property incentives. I can think of tax incentives that go to the consumer, that go to the commercial motor vehicle operator, that go to the OEM.
You can think of, again, as an economist, I think of what incentivizes behaviors. Tax credits, tax
breaks of different kinds. That is potential deployment incentive.

As a consumer, with the tolling device, if you said, "Well, I am going to give you a 10
percent discount for EZ Pass," when I use my SmartCard in the Metro, I pay a dollar less than if I
use a paper farecard. That is an incentive for me to use a SmartCard. If I bought a hybrid car, I
had the incentive that I could use an HOV lane. So, there is an incentive for someone to buy --

MEMBER McCORMICK: But in terms of all those tax incentives, given the current
Administration, the current climate, the current fiscal environment that we are in, are those even
worth recommending, the tax incentives?

I am talking about from the government's perspective whether it is likely to occur, not
from whether or not I would like it as an individual consumer.

MR. LEONARD: I would refer you to Section F and look at what Congress asked for in
the language.

MEMBER McCORMICK: Okay.

MR. LEONARD: You know, they asked for a report on incentives. The incentives
merely could be, well, what incentivizes states, localities, consumers, drivers? If you think about
the different groups that need incentives to get intelligent transportation systems in use and
deployment, and we talked about the day-one benefits issue; we talked about early adopted; we
talked about aftermarket. What is going to incentivize me as a driver with a 10-year-old car that I
am not going to replace for five more years to put an aftermarket device in my car that is only going
to cost $100?

MEMBER HAMMOND: Do you want us to just give you ideas or a roundtable? Or do
you want it in another form?

MR. LEONARD: Well, again, I would like written input, but we can have a discussion on these things. And this is not a one-shot deal where I am going to ask this and we are going to write all the answers down today because we are not writing this report today. We have got time because we are going to do this over the next year.

MEMBER HAMMOND: It just seems like, with technology advancing at the rate it is advancing, that there are things that need to be tested on the ground, and the incentives ought to go those places, where it is the state or an NPO or a local agency that wants to test a technology that will perform to some performance measure. Or you have got to link it now to performance measures. That is what MAP-21 is all about.

And it seems like, rather than giving people cheap transponder tags, that to let the market drive that, but invest in something that a state or a locality or an NPO could say, "If I get a little bit of money to try this, then we know it will grow."

MR. LEONARD: Seed money.

MEMBER HAMMOND: Yes, and that is where progressive states and cities have made those advancements. And then, people start clamoring for more, once they see how good it is. And that would be my advice from the state DOT perspective.

MEMBER ALBERT: I think there is so much to be gained from proof-of-concept.

MEMBER HAMMOND: Yes.

MEMBER ALBERT: Of doing something small and just showing that it works, that it leads to much bigger things.

But one of the things I counseled you on, Ken, and I have seen it over the years, is many
times the rich get richer. Those which have received money in the past and have developed partnerships and have been around for a long time, some quarter or coalitions that may go unnamed in the Northeast continually get multimillion-dollar grants. Well, because, yes, they are working together, but they are kind of the rich folks, and they continually get more money versus others that need to start something, but don't have the seed money.

MEMBER HAMMOND: But they are also performing. I think you have got to link it to performance in some way --

MEMBER ALBERT: Yes.

MEMBER HAMMOND: -- that provides that public benefit.

MR. LEONARD: Ton, you had something?

MEMBER STEENMAN: Two things, actually, maybe three things.

To your Strategic Plan, I think it would be useful end-to-end to kind of highlight security as one of the things that we should do more work on. And it is not just in the car, right, but to your larger transportation vision.

And to the comments that Scott made about big data, there are probably a whole bunch of things where we are thinking today we have to solve it with technology in a device, but, actually, if you get a bunch of data from a whole bunch of devices, you can actually solve the same problem in a dataset by just looking at the data and, actually, gleaning some very interesting insights out of that.

On the incentive side, you know, we might want to think more in terms of, what can I put in place and create incentives for that actually maybe costs a little bit of money, but they actually save the government more money on the other side of it, right? Because there are certain things you can do, technology particularly, that would automate things and make things better, that would
actually receive a whole bunch of money on the other side of the ledger.

VICE CHAIR KLEIN: You know, there might even be an economic development angle on this, as an economist. There is a big industry out there, and it is growing fast. The network infrastructure exists. We are seeing more and more connectivity. It is just begging for people to take advantage of these capabilities to develop apps and sell them and products and services and data. And that is just growing exponentially.

And the role of the DOT, it might just be sit back and watch it happen, because I think we are at the point where it is happening. But there might also be understanding dynamic, and where do you strategically intervene, possibly at rather low cost, to channel this tsunami of economic development, technology development, product development, in a way that is favorable to the public mission of U.S. DOT?

I think, without getting into specifics, I think that way of looking at it, that there are strategic acupuncture points that bring it towards the DOT mission, would be very productive.

MR. McCORMICK: What I would like to say about this, I don't want to view this as an Eisenhower Expressway. I want to build something, declare victory, and walk away. I mean, I think the way you have outlined the document that I have looked at, you are looking at helping it get deployed, helping evolving it, helping mature it, right?

And I don't want us to be linear thinking about, well, okay, we are only going to be talking about the things we are talking about today. There are things that these two gentlemen over here are developing. A guy next to them has a tier developing, that the mobile environment is working at the processor levels. You know, there are a lot of things that are out there that are growing.

A Strategic Plan shouldn't be five tactics, and we call it a Strategic Plan. It should be
something that allows us to incorporate those evolutionary changes, those possibly destructive
technologies that come in.

We did this with Federal Highway a couple of years ago because they struggled from the
fact that they had academics pressuring them; they had congressional people pressuring them; they
had industry; they had their own administrators. And it was very difficult for them to kill a
program. Okay?

It is kind of like the Department of Energy. They said, "Okay, we are done discovering;
we are done studying hydrogen. We spent several billion dollars on doing that. So, we are done;
we will go study something else."

Well, industry and Congress weighed-in and all the special interests and said, "Oh, no, you
still have to put $150-200 million into it because we have got momentum behind jobs that we are
employing and everything else."

And I think the approach ought to be, or one of the things I am going to recommend is that
we incorporate a mechanism for introducing new technologies, new requirements, new needs, if
you will, new areas of opportunity, so that we don't have to worry about whether or not we have the
opportunity to develop research around whether or not 802.11ac versus p can interact.

Create a mechanism whereby those things can be brought into the research spectrum
earlier on. Maybe partly that is just coordination with the other agencies or identifying
mechanisms to do that for your organization.

MEMBER SCHROMSKY: You know, one thing, I was looking -- I just was talking to
Scott -- I am looking at an email that I just got. "Welcome to the Vehicle Data Jam Challenge;"
right, that Greg Winfree -- I don't know who that is -- is a participant.
(Laughter.)

This will probably be one of those things that, you know, I will get the data somehow some way. I mean, I look at this, and, Bob, going back to our thing, we started this over a year ago, why we are not talking. From my perspective, figure out layer one, two, and three from the OSI model. The marketplace will dictate. I just need a common framework that I could build off of.

MR. LEONARD: Right.

MEMBER SCHROMSKY: So, if you put DSRC into the vehicles, and figure out the security, the pitfalls of doing that, there are so many different apps. There is academia. There are students that will take this data, just like GPS.

You know, I just watched a "60 Minutes" piece, right, and the guy that founded Square, right? His whole idea is, when somebody walks into Starbucks, by the time they walk into Starbucks, their picture is on the screen because the location was determined from the phone to the point-of-sale machine. I don't think the military, when they developed GPS, had that idea in mind, right?

(Laughter.)

Just give me the framework, one, two, three, and everybody agrees. Because what I am trying to understand here, and just kind of a feedback loop, like they said today, if I regulate and say, "Okay, you have to put it into your vehicles," right, okay, I put it in your vehicle. Now what? Okay, I put it in your vehicles. It is a mutual benefit. So, you have to share, you know, vice versa.

The technology piece can be fixed or solved, security, how it works, certs, and all that, but the sharing of that data, you know, I have to detect if the car is coming, where I don't think we have looked at that. I think that is where I look at DOT in kind of setting the guidelines and setting the
precedents and saying, "Okay, we established this framework. From a safety standpoint, here is what we think and what should be done." At the same time, there is a lot of data here that we will provide, that application developers, whoever it may be, can use that information and develop things we can't even think of today.

VICE CHAIR KLEIN: Create a fertile environment for innovation.

MEMBER McCORMICK: Well, I don't know that I agree with that. I mean, innovation exists out there. The city of Boston, they spent money and Seattle spent money collecting information and putting in the process whereby they could know where all their vehicles were through GPS, well, their GPS operation. The problem is they didn't have any money to go any further with it.

In an act of absolute brilliance, they said, "Well, let's just put the data out on the web." Within one week, there was an Android app that you could pull up on your phone and find out where your bus was. Within two weeks, there was an iOS app.

I don't think we can do anything to foster innovation. I think that is a miscalculation.

VICE CHAIR KLEIN: But the CIO did something to foster innovation.

MEMBER McCORMICK: But they did something that innovators were able to take advantage of.

MEMBER SCHROMSKY: I created a dataset, though.

MEMBER McCORMICK: You have got to create the environment.

MEMBER SCHROMSKY: Exactly. You have to create the dataset. There is data off of that vehicle.

Now there was a little bit, I would say, discussion today of where am I getting that data
Could I get it more from this? Or I can come to the vehicle itself. I mean, that is kind of up for debate. And who will win ultimately we don't know.

But just getting access to data that we don't have today and pulling that out and extracting that is very valuable, I think.

MR. FEHR: I would just like to point out the Research Data Exchange, its-rde.net. There is some up there right now, particularly for those people interested in figuring out what they could do with data that they harvested from our vehicle-to-vehicle activities. There is actually a dataset out there right now.

So, we made that announcement at TRB and several other venues, and we had I don't know how many tens of researchers access that already. So, we on that path.

Anyone here is welcome to take that back and pass that around to your communities, its-rde.net.

VICE CHAIR KLEIN: Would you characterize that as open data? You have got the datasets. It is public data. Put it out there. Let people run them.

MR. FEHR: Yes, that is one of the things that we were trying to figure out, is how to actually do that. It is a nice idea, but there are limitations and other considerations. And so, this is the Department's first attempt at coming up with a way of doing that in an open environment.

So, the groundrules for using it are posted. There is meta-data provided. So, it is a fairly well-thought-out concept that they have. They are grappling with those restrictions as opposed to openness that you have to grapple with and trying to come up with workable ways of making as much data available in the proper context.

So, take a look at that as an example. My friends at Federal Highway who are actually
doing this would love to have feedback.

MEMBER McCormick: Walt, what is the website again?

VICE CHAIR Klein: Roger, David, Echo.

Mr. Fehr: Yes, R-D-E, Research Data Exchange.

VICE CHAIR Klein: Then, maybe there is a federal role for -- if this data is in a million different jurisdictions, in every jurisdiction there is worry, "Oh, my God, can I release this data? Will I get in trouble?" Who knows what is going on?

Some national standards might (a) educate people, so they know where the risks are and what they are safe to do, and give them some assurance that what they are doing is okay. It facilitates that open data, which, in turn, facilitates feeding it to entrepreneurs who will take the ball and run with it.

Mr. Fehr: There are a lot of very serious considerations that go into something as simple of an idea as that. And that is what they are grappling with, that Research Data Exchange, is trying to figure out how do you actually do it.

It is a nice. It is an easy idea, but it is hard to do operationally, but they are trying.

So, particularly if you are interested in getting an early look at what might come out of these vehicle-to-vehicle crash-avoidance types of vehicles with their heightened level of ability, there is a trial dataset out there now. We would very much like to get feedback on its usefulness, whether people are actually able to do something with big data. There is big data out there.

Chair Denaro: So, we have got these two reports. We have got comments on the Strategic Plan, the next Strategic Plan to be developed. And now, on deployment of all ideas, technologies, incentives, and what might be there.
What I am going to propose here, when Ken is done, is that, at the risk of creating more work for us, but that we actually form some additional subcommittees to really knock these out and get some answers.

So, I am hearing a lot of interest in this. So, that is good. Maybe we will be successful in doing that.

MEMBER KIRBY: I just want to come back to what I think sometimes the federal government underestimates the leverage it has with a relatively-modest amount of money. You know, Ken was talking about billions of dollars. We don't expect billions of dollars certainly.

But I think where potential exists with respect to the point about fusion of data, I mean, you don't want to fund things that the private sector can do a better job of. That is the last thing we want to do.

But there are public sector functions and coordination and fusion that need to be done to enable these private sector apps to take place, right? And that is happening now.

I mean, there is all kinds of real-time data, traffic and speed data, and transit operating data, and all kinds of weather data that can be integrated in a fashion that is, then, usable by one of these apps.

And it is that integration and fusion piece that requires a number of agencies to actually work together, and that is not their first priority usually. But, I mean, if there is some money there, and it doesn't have to be a lot, you can make things happen. If the funding is there to get something started, then people will say, "Hey, this is great. We can't stop doing this." And then, you can walk away and it will take over on its own.

But it is getting it started is where we need your help because there is such a competition
for money at the local level. For us to pull money away for an innovation from day-to-day
operations is really very tough to do. I think there is a lot of leverage there.

Things that are institutionally difficult, that are politically difficult, if you put a lot of
money on the table -- not a lot of money -- a little money on the table, you would be amazed at what
can be done. We will do anything for money almost -- including things we wouldn't normally do,
yes.

It is like, well, gee, you know, if we don't apply for that money, someone else will get it.
So, why don't we just take a deep breath and do this because we will get that money.

So, there is a lot of leverage potential there, I think, for relatively-modest amounts of
money. And that is what I see the potential in.

You know, this says "incentives for deployment," and you seem to be talking in terms of
big projects, big money projects, and taking money away from R&D. I don't think that is what we
are talking about.

MR. LEONARD: No, and I am really looking for any kind of incentive, large or small,
that will help get ITS out.

One of the things we do -- and this is a relatively-low dollar value -- we have a
professional capacity-building training program where we go out to state DOT employees and teach
them about ITS systems or how to apply for a grant to do a certain thing.

At ITS America, we are doing a training session on connected vehicles, so that people
know a little bit more about connected vehicles. Because there are so many people who are
working transportation issues at the state and local level who still think it is the "Its" Program.

They don't know what Intelligent Transportation Systems are and don't know what a connected
vehicle is.

So, education is a very good return on the dollar there in terms of getting people into the system and knowledgeable about it, so that they can do small projects.

And so, I was kind of in jest there about it. I don't think we are going to get a half-a-trillion dollars to go deploy ITS systems. I do think we can do some great things with small amounts of money.

You do know that Federal Motor Carrier has a targeted -- it is the only ITS-targeted program, but all Highways grants are available for ITS programs. One estimate that I have been given from the Highways folks in Operations is about a billion dollars a year in Highways grants are actually going to support deployment of ITS systems around the country every year. And states are probably spending another billion or two of their own money, not states, but localities are probably spending another a billion or two of their own money. I know Virginia is investing some of their own money in ITS systems.

So, I agree, it doesn't have to be mega-projects to do some of these things. So, I am really just looking for a basket of incentives, and not just for state governments and not just for industry, but also for consumers, drivers, and individual users as well.

But an incentive is an application that turns the light green when I am sitting at the traffic light at 2:00 in the morning and I am the only car within three miles. Having a traffic light that turns the light green for me, so I can get home three minutes sooner, is a benefit to me. And if I do that every day, I am willing to spend $100 for an aftermarket device for my 10-year-old car that I am not replacing for five years.

MEMBER KIRBY: Yes, we are trying to do bus priority in our region for multiple bus
systems, multiple state DOTs, multiple signal systems, doing a procurement to get the technologies, so that things can talk to each other just in this region. And we have the money. We have a TIGER grant.

It is very hard to do, just because of the different institutional histories and preferences and things like that. I mean, we have got the money and, by golly, we are going to figure out how to do it; otherwise, we might lose that money; someone else might get it.

But, without that, everyone just said, "This is just too hard. I mean, let me go away and do something that I can control over in my little agency over here."

MEMBER CALABRESE: But that is a great case. Even if you have the money -- and I go talk to people about bus priority systems -- even with the money, there is so much concern because of lack of knowledge and lack of the bus, where if I tell people it works and doesn't screw up cross-traffic, it is one thing, but if U.S. DOT does, it is a whole part of the education process.

So, there are things out there that, if you can put your stamp of approval on, it probably could have wider acceptance among people.

MR. LEONARD: That is part of the idea behind having affiliated test beds and prototypes. If you can drive to the next state and see a test bed in operation, "Oh, that's how it works? Really? You get 10 percent better throughput in those intersections now, fewer traffic jams, lower accidents?" If you have got performance data that says this is working, that will help people want to install these systems.

MEMBER KISSINGER: I just want to mention in the area of big data, data integration, and data-sharing, and not data for data's sake, but for managing programs, if you are not familiar with this, there is a fantastic experiment going on in Utah right now called uPLAN. uPLAN, you
can Google that, and it is a great public/private partnership involving lots and lots and lots of private companies.

It is more on probably the traditional FHWA side of things than it is RITA or Transit, or whatever. But it is absolutely amazing what they have been able to do, and it is spreading around the country. I mean, right now, those six or seven states that are surrounding Utah have already agreed to buy into the concept, and it includes, among other things, total transparency of the data.

In fact, there is thing called UGate, and anybody can go in there and request any data that exists in that State; they can get it.

CHAIR DENARO: We are on your last one, Ken?

MR. LEONARD: Yes, I have got one last "ask," and we have kind of talked about this. But one report I do have a due date on is DSRC or communications, vehicle-to-vehicle and vehicle-to-infrastructure communications report.

Tim Klein mentioned it. It is the one that is due October 1st of 2015. And it was the one that he said was spectrum-agnostic.

Obviously, as we know from the presentations we had today, spectrum is a big issue. Again, this is an area where I want to ask the Committee for its input and advice, in particular, in what I need to report back to Congress on the issues that were identified in their request of the Program Office around V2V and V2I communications.

I am not going to go too far into it because we have really kind of to some extent discussed this at great length today. But I do think it is an area where the Committee, in addition to whatever letters the Committee chooses to write, input that would help support this report to Congress and describe what we have learned about DSRC and about connected vehicle communications would
be helpful, yes.

CHAIR DENARO: So, I am not understanding, Ken, what that is that is different than
what you are already doing and getting from the program, and so forth. Help me understand that a
little better.

MR. LEONARD: Well, when we had this "ask," I didn't know what the Committee was
going to do with regard to spectrum. So, I didn't have the advantage of having had this morning's
discussion, which has helped clarify the position of the Committee a little bit.

Congress did ask us to report --

CHAIR DENARO: I see.

MR. LEONARD: -- back to them on vehicle-to-vehicle and vehicle-to-infrastructure
communication. So, it was a specific "ask" from Congress.

And again, the language is in your Appendix F. It talks about defining a recommended
implementation path for DSRC technology and applications.

I think some of this is going to become obvious through decisions, the AASHTO
footprint, and the guidance. It talks about including guidance on a relationship between the
deployment, communications, and our national architecture. And I think this Committee has been
briefed before by Steven Sill on the CVRIA, the reference architecture. So, we have to draw
connections between our communications plan and our attachment.

And then, again, it has this clause in there about being spectrum-agnostic. When we talk
about connected vehicle, we talk about multiple communications possibilities. DSRC is one of
them, but cell is another communications mechanism.

And I think some question was asked about what is M2M chart in here, which I think this
chart kind of describes that there are multiple communications mechanisms open to connected
vehicles.

So, we have to report back to Congress on our communications strategies and what we plan. We have to do this -- we have a considerable amount of time, about two years.

But that should also be syncing up with some of the FCC decisions --

CHAIR DENARO: Right.

MR. LEONARD: -- and NTIA reports, and things like that. So, again, I think this is an area that the Committee is going to want to weigh-in on, and I thought it would be a good area to ask for input on.

MEMBER BELCHER: So, Ken, the Department is hamstrung with what it can say publicly. I don't know what you are saying to the FCC directly and to NTIA. I know you can have different communications in that realm than what you can say publicly.

And so, would it be helpful -- I mean, I am trying to decipher what you are saying, what you are asking -- would it be helpful if the Program Advisory Committee again gave you a stronger response in this area that you could reflect as you went back to Congress?

Because I suspect, as you go back to Congress -- and I don't know, but I suspect -- you are going to have some of the same political limitations that you already have. You can't control what we recommend or say to you. You can only control your own environment.

And so, is it helpful for us to say things that you have to reflect on as you go back to Congress? Is that --

MR. LEONARD: I think it is always useful, when the Department reports back to Congress, I think it is always useful to show that we have done our homework, that we have looked
at the issue broadly, that we have listened to a variety of stakeholders and constituents, that we have sought advice from experts, and that what we are reporting back is, in fact, driven by data, driven by documented and informed opinion.

And so, I think that is very useful. Much the same way that FCC creates a docket which represents a broad array of opinions, I think when we report back to Congress, we have an obligation to report to Congress that there is a broad array of perspectives on different issues, and here is what we know about the different arguments and different approaches to a problem.

And maybe the Department has a specific recommendation, and we explain what we found most compelling in that argument. And then, Congress does with our recommendation what they choose.

But I think, if we are going to report back to Congress as they have asked -- and we have to, so we will -- I want that to be a document that speaks well for the Department and its position, shows it is informed, shows it did its homework, and listened to the right voices and a broad array of voices, and is accurately reflecting those.

Just like when we had presentations here, again, I want to make it absolutely clear, it is not that we think the folks at FCC are ogres. I think they have a very important public interest in mind.

MEMBER BELCHER: So, could I just, maybe for the sake of being careful what you ask for, Ken -- and Bob can attest to this. I have sat on this Committee for four years now. And you have had an awful lot of second-guessing in this Committee about whether DSRC is good or bad, whether we should be looking at something else.

And we have kind of made a calculated decision here that we are not going to fight that fight anymore. You have made your decision there, and there are people who disagree with that
decision. But at least I think Bob and Hans have done a great job of saying, "Look-it, the decision has been made. Let's give DOT the best advice we can give them within the parameters we are working from."

So, I am not sure you want to open up the question to this Committee about whether DSRC is the best route to go again, because I know I don't want to sit through those conversations again. They have not been fun.

(Laughter.)

MR. LEONARD: I actually think, just based on what I have seen in terms of the cost/benefit analysis, I think I can make a pretty decisive argument in favor of DSRC on that basis alone as a communications medium.

I think what Congress is really getting at is more of strategies for implementation. I think, to some extent, this also talks to deployment issues.

MEMBER STEENMAN: I think from a strategy perspective, though, I agree with you that we don't want to rehash this, but the technology and the data that comes off of consumers and the infrastructure is evolving so rapidly.

I was in London last week, and I am on an advisory committee to make the city of London intelligent. If you look at like the two main colleges there, ICL and UCL, what they are doing in trial deployment, they are kind of instrumenting London. And all of the data they will get out of the energy grid, the water supply, transportation system, everything else, they aggregate it all up, plus all the consumer data, in five years from now, we might be able to do so much with that. It might make something like DSRC completely like an investment that you don't get such a great return out of.
So, I think we need to continue to look at these alternatives and how the industry evolves. I think that would be a very good thing to do. I mean, this will all continue to evolve very rapidly over the next few years as big data capabilities really mature, because we are really kind of on the forefront of that technology really maturing over the next five to ten years.

MEMBER BERG: We have heard that same argument for the last 15 years, honestly.

MEMBER STEENMAN: Well, but these are different.

MEMBER BERG: That is what they said 15 years ago.

(Laughter.)

That is exactly what was said 15 years ago: "Things are different now." "Oh, we have this internet now."

MEMBER STEENMAN: Fifteen years ago, you couldn't make the argument that scalable cloud computing was as mature as it is today.

MEMBER BERG: We were working on mainframes. So, that is about as cloud computing as you can get. I had a dumb terminal and making entries.

CHAIR DENARO: But you guys have some applications. There is going to be a track there. Look what has happened to transit. Just opening up transit data has been incredibly beneficial, and the user base is enormous.

So, I think let's be data-driven, even when it comes to data. Do we have actually a track record of success? And the answer is, yes, I think it has grown. That might be something -- maybe it is a DOT function -- to assemble, okay, what are the winners out there and can we draw lessons from that about how to proceed?

MR. LEONARD: The other thing I will say about all four of these "asks," while I am
required to provide reports to Congress, you are not necessarily, although the singular report to Congress out of the Advisory Committee is within the charter of the group. These other three activities or responsibilities in my office, I am simply soliciting advice, which is the function of an advisory committee.

You can choose not to respond to any of these. That is an option. Or I prefer that you not, but, you know, if one or two of these are things you don't want to take on or you want to limit the scope of it, I will understand that. I understand you are all very busy people. But these are important topics for the Program Office, and I think these are areas where you, as individuals, can make some interesting statements.

I will tell you this. You all know this. Things are going to be happening in the ITS community seven years from now that none of us are thinking about today. Things are happening today that none of us were thinking about seven years ago. So, we can't predict all that, but --

CHAIR DENARO: Ken, I think what we are struggling with is your No. 1 is something we are already doing. So, that is done. We are going there. We will get it to you on time this time.

No. 2 and 3, your Strategic Plan and Deployment Incentives Report, I think you heard a lot of interest in that. Yes, we are all too busy to do that. The last thing we need is more stuff to do. But I don't think we can stop ourselves. So, I think we are going to respond. We are going to figure out a way to do that and get you something.

The last one, I think what we are struggling with is what to say. I am looking at, I am reading the section that is here now, and I don't know what to say. And I think maybe that is why you are asking us. What you get back is the same thing you are struggling with. I don't know
what to say about that.

    MR. LEONARD: Yes, and that is, in part, where I am at. You know, probably the most
telling is I have got to submit a comprehensive plan, "a detailed, comprehensive plan that addresses
the manner in which incentives may be adopted as appropriate through existing deployment
activities carried in on surface" -- oops, I'm sorry.

    CHAIR DENARO: That is the incentives one, yes. Yes. No, this one is back on the
second-to-last page.

    MR. LEONARD: Yes, the "asks" here -- yes, this is two years out. I have to provide
recommendations on short-range communications technologies and applications. Essentially, it
has to relate to our architecture and standards, which we are developing. And it should essentially
be frequency-agnostic.

    CHAIR DENARO: Okay.

    MR. LEONARD: So, this may be an area where we submit a relatively-short report that
reflects the advice we have gotten from, you know, the positions we have taken with regard to our
communications with NTIA and FCC around the spectrum issue. It may reflect things we learned
through the NHTSA decisions. There may be other pieces of advice that you, as an Advisory
Committee, have and can contribute to.

    I don't have a specific thing that I know.

    CHAIR DENARO: Yes.

    MR. LEONARD: In other areas, I can think of --

    CHAIR DENARO: Yes, exactly. That is what I am talking about, yes.

    MR. LEONARD: In this area, I don't have a specific example, but --
CHAIR DENARO: Well, here is one that I have in reading this now, just thinking through it. I remember one or two meetings ago Walt gave us a presentation and showed us the LAN architecture, and so forth, that the choice of the frequency and particular transport means was merely one of those layers. Nothing else would change if at some point we want to change from DSRC to something else. To me, that is the answer to this. We have an agnostic system in terms of the fact that it is just one of the layers there.

Right now, we believe there is a compelling reason why DSRC is the way to go, for all of its attributes and what we have discussed all these times. But, at some point along the way, we designed a system such that it is minimal effort as we can come up with to change that at some point, if there is a better way to go.

VICE CHAIR KLEIN: Sure, and any medium that is a fast, mobile network, I mean, if you can get your tin cans on a string to go really, really fast, you can run DSRC over it.

But the engineering that I understand is that DSRC is currently seen as the best -- let's say that debate was settled -- it is the best technological solution to realize a fast, mobile network which gives us the safety benefits.

CHAIR DENARO: So, just to summarize my colleague there -- I mean, we could certainly write this; then, I am looking at the Committee, you know, if I am missing something here -- but the recommended implementation path, that is DSRC. And here's a whole bunch of reasons why we agree with that.

And as far as being frequency-agnostic, the point is, again, it is a LAN architecture. That could change if there is something better than comes along.

Am I missing something?
MEMBER SCHROMSKY: The whole idea of what DSRC is for was the cost benefit. There is no interim cost for using that.

VICE CHAIR KLEIN: The implementation path, my understanding of implementation path is that the implementation path is there is a collective action problem for implementation that is solved through regulation by NHTSA. The way to implement DSRC is to get everybody to simultaneously implement it, and you can only do that through a governmental intervention to mandate everybody, as of day such-and-such, starts to implement it.

So, the regulation is part of the implementation package, and it is a necessary step to overcome a problem of coordination. You get multiple industries to do the same thing.

MEMBER BERG: I would say that is not the only way, but that is the best way, given some consideration. Because Europe is doing it voluntarily. So, there is another way to do it. It just maybe doesn't meet all the criteria of the situation in front of us right now.

I think what you are asking, Ken, is here are some options, and here might be the best way, based on what the Advisory Committee has looked at being the requirements today. To look at the other options I think is not just interesting, but necessary to be able to show that there are other ways to do this, and they are just not as good.

VICE CHAIR KLEIN: Yes, right.

MR. LEONARD: I mean, I do think -- and you have all been looking at this a lot longer than I have -- that DSRC and the NHTSA decision is our fastest path to establishing connected vehicles, which is an accelerant in the move to autonomous vehicles and to moving from warning to control, which is a path that the automakers are on already.

I have been in some of the experimental vehicles that are doing automatic braking. That
is going happen with or without connected vehicles. But how that will be utilized, how that will fit
into a larger system, I think will be accelerated by connected vehicles.

I think the connected vehicle creates the opportunities for mobility and environmental
applications that don't exist solely with autonomous vehicles that are contained within
OEM-isolated systems. So, I think DSRC really provides that opportunity here.

But, to some extent, as I was listening to the discussion earlier this morning, and the
Committee was saying that it wanted to draft letters to NTIA and FCC, I was thinking, well, that
might just address part of what I am looking at.

We have to pull together a report, and it will explain how DSRC fits into our plan and into
our architecture. And perhaps what I would really use from the Committee, from what I have
heard today, is essentially the letters that you have already talked about proposing, because it really
probably hits on the issues that I would expect --

CHAIR DENARO: Yes, some of the issues, yes.

MR. LEONARD: So, I mean, as I opened with this one, I have kind of beat this topic to
death a little bit already. But I do think that Congress has asked for us to report back on this
communications mechanism, how we got to where we are. And I think by the time they get the
report back, all will be revealed to them, essentially, because I think we will be past that light
vehicles decisions. I think we will be past a heavy vehicle decision. And I think that the
infrastructure footprint will be on the immediate horizon. And I think the FCC and NTIA actions
will be clearer, too. So, I think we will have a fairly-decent and complete communications story
two years from now.

CHAIR DENARO: So, what I would recommend is, why don't we sleep on this last one?
MR. LEONARD: Okay.

CHAIR DENARO: I mean, the others, well, let me just say, process-wise, what I am suggesting is we have this period at the end of the day tomorrow. It says "Advice Memorandum," but I want to expand that to all these things that are on our plate and discuss how we are going get those, if we are going to get those done, and how we are going to get those done. And then, this will be one of them.

But what I would suggest is let us sleep on this. And then, tomorrow in that session we can talk about whether we have already dealt with this with the other letters we are doing, as you are suggesting, or whether there is maybe something consolidated we might want to put together, a couple of paragraphs or something to help you there. I am not grasping a way to go here yet necessarily, but that is my suggestion.

MEMBER RAJKUMAR: One suggestion for the Strategic Plan, I thought you implied the formation of a subcommittee.

CHAIR DENARO: Yes.

MEMBER RAJKUMAR: But you didn't ask for volunteers.

CHAIR DENARO: Yes, and what I am saying is that is my recommendation.

Tomorrow afternoon let's talk about that.

Like you all, I have been thinking about we just -- you are already signed up to subcommittees and we are doing that. That all has to do with No. 1, which is a report to Congress.

**Request for Advice -- Summary**

I am just summarizing here. We said we are going to write a letter directed at NHTSA in terms of their proposed rulemaking, and we need to figure out who is doing that effort.
We now have the spectrum-sharing thing that we had a great discussion on today. Hans kind of led us through that. That is something we have to do.

And then, on top of that we have three additional things, the Strategic Plan, the Deployment Incentives Report, and this last one we just talked about in limitation.

So, what I want to understand tomorrow, before we all go home, is which of these are we going to do and how are we going to do them, and who are the name tags, leaders and workers both.

MEMBER KIRBY: Just a process issue. There is quite a bit of writing to be done, writing a report --

CHAIR DENARO: Exactly.

MEMBER KIRBY: -- and letters and all kinds of things.

CHAIR DENARO: Correct. Correct.

MEMBER KIRBY: And that takes time.

CHAIR DENARO: Yes.

MEMBER KIRBY: And after tomorrow, we are going to go back to our jobs.

CHAIR DENARO: Correct.

MEMBER KIRBY: Can we get support from the ITS Program Office --

CHAIR DENARO: Yes.

MEMBER KIRBY: -- staff to help us write this? Or do we have to physically write it ourselves?

CHAIR DENARO: We really can't get help from --

MEMBER KIRBY: No, no, I mean we can't.

CHAIR DENARO: Yes, we really can't help from them on writing it.
MEMBER KIRBY: Yes. We have got to do it ourselves, huh?

CHAIR DENARO: Specifically, yes. I mean, putting something in formats, or whatever, I mean, we can get help with, but not the actual generation of the thoughts.

MR. LEONARD: Getting it into a format suitable for presentation to the Secretary, we can do that. We can't write our own advice.

(Laughter.)

VICE CHAIR KLEIN: If we could, this would have been a shorter meeting.

(Laughter.)

MEMBER KIRBY: But we are only providing advice, right? Things that we think the Secretary should go and do, right?

CHAIR DENARO: Frankly, I mean, we will talk more about this tomorrow afternoon, but just so you know where my head is, and I tend to bite off more than I can chew, so fair warning, full disclosure.

But I think we are pretty far along on our final memo, I am hoping. Our breakouts tomorrow will determine that. But I am feeling pretty good about the fact that we are pretty close to putting concrete recommendations on the table for at least the subcommittees. It is, then, a matter of us getting to consensus as a Committee, throw some out and keep others, whatever, and do that. But I think we have got good progress there. So, that may be in hand.

I think, with Hans' work today, I see a path where one person writes a -- I am talking about the spectrum-sharing issue -- one person writes a strawman; the rest of that Subcommittee I think is very strong. You guys kibitz and everything else. The rest of us read it and we say, "You have got to change these couple of words, and we are good to go." So, I am seeing my way clear on
The NHTSA one we haven't talked a whole lot about, but I think that is a fairly simple document. Maybe I will volunteer to draft the first part of that or something, based on what we heard.

And then, these others, again, I think there is enough passion in here that maybe, although we are all very busy, maybe we can find one person on each of these who is willing to do a first draft, after which it is a lot easier for everyone else to kibitz, once that is done.

So, we will see. That is what we want to talk about tomorrow.

Any other comments? We are, wow, like 30 seconds over time.

Yes, Scott?

MEMBER BELCHER: I am going to be gone tomorrow. So, I would like to invite everybody to the ITS America Annual Meeting, if you haven't already made your plans. That is going to be a great meeting, and many of you are participating in various ways. It is a good place to see everything that we have talked about here today.

CHAIR DENARO: Remind us where, Scott.

MEMBER BELCHER: It is April 21st through the 23rd in Nashville. All the information is on our website.

We will have the Under Secretary for Policy, Polly Trottenberg, there for the majority of the meeting, as well as Ken's boss, the head of NHTSA, the head of FHWA, the Deputy Administrator for FMCSA, which is the motor carriers, and over 20 state CEOs represented as well.

So, we have got a pretty big meeting going on. So, I urge you all to come.

CHAIR DENARO: All right. Thank you, Scott.
And then, for logistics tonight, again, the restaurant is McCormick & Schmick's, a pretty good place, seafood, affordable. There is no host. So, we are all on our own here. Seafood plus other things on the menu. It is 901 F Street, Northwest, and four stops on the Green Line right down here.

MEMBER McCORMICK: Yes, it is right underneath. Get on that one going toward Greenbelt. When you get off, it is right across the street.


MEMBER McCORMICK: Yes.

CHAIR DENARO: And it is the Gallery Place stop, right?

MEMBER McCORMICK: The Verizon Center.

CHAIR DENARO: And the time is? It is six o'clock, right?

VICE CHAIR KLEIN: So, 5:30 in the lobby; 5:30 in the lobby we will assemble and start getting ready to hop on the Metro.

And the Frequency Memo Drafting Committee, let's powwow for a minute before we all run away.

CHAIR DENARO: The what?

VICE CHAIR KLEIN: The FCC Spectrum Subcommittee.

CHAIR DENARO: And tomorrow, for those of you who don't make the dinner, we can start again at 8:00 sharp.

ADJOURN

(Whereupon, the meeting adjourned at 5:04 p.m., to reconvene the following day, Thursday, March 28, 2013, at 8:00 a.m.)
Day 2  
March 28, 2013

(8:08 a.m.)

CALL TO ORDER

DR. KLEIN: All right, ladies and gentlemen of the ITS PAC, welcome to Day 2. We had what I thought was a very productive meeting yesterday.

Okay, now let me not forget the most important thing, which are lunch order slips. I had the chunk tuna salad yesterday, thought it was pretty good. But the toast could be a little more toast or maybe better without any toasting whatsoever, but other than that it was a delicious sandwich. I recommend it to the rest of you. So fill those out and we'll get those collected in a little bit.

Today is a slightly different format. We're doing less listening and more thinking and ultimately more producing of things.

So if you look on Tab A, on the second page of our agenda. Thursday, March 28th, reconvene today.

A few comments and notes today. And then even as I talk, I hope that a little bit of water and breakfast bars will appear.

So we may have a minute to grab those as we head out to the second section, or the first substantive session of the day, which is going to be our subcommittee breakouts from 8:30 to 10:00 a.m.

I believe we have three designated spaces for breakouts. And a fourth one is going to be a little bit on the fly, which maybe best of all. We may get the café.

We have this room, we have that room, we have a third room, yes, in that direction?
CHAIR DENARO: Right.

DR. KLEIN: And a fourth room downstairs?

CHAIR DENARO: Yes.

DR. KLEIN: We may have to take a walk.

CHAIR DENARO: Fourth room meaning the lobby or something like that.

(Laughter.)

MR. MCCORMICK: I need to use the projector first.

DR. KLEIN: Okay, we need this phone bridge, our Standards Committee needs the phone bridge. You need the overhead slide projector? Do you have a large screen laptop? It will be a relatively small group.

MR. MCCORMICK: No, I've got a netbook.

DR. KLEIN: What's that?

MR. MCCORMICK: No, I've got a netbook. It's a small screen, but I have a netbook.

DR. KLEIN: Okay. Let's figure that out then later.

MR. MCCORMICK: Okay.

DR. KLEIN: As soon as start, when we get to break.

CHAIR DENARO: Is there any other way to do the phone bridge with any other projector?

DR. KLEIN: Can we drag the phone bridge down to this end?

MR. GLASSCOCK: Okay, let me see if we can do that.

DR. KLEIN: Yes, okay. But our subcommittees will break out to Committees.

MR. MCCORMICK: We might be able to just roll the project into the next room.
DR. KLEIN: I bet it's easier to move the phone. If the cord --

MR. MCCORMICK: Okay.

DR. KLEIN: -- is long enough. Of course that means this, is this a close, yes those are slidable.

We have a speaker at 10:30. Actually, we have two speakers at 10:30 to 12:00. First one is Andreas Mai from Cisco Systems. He's not here --

MR. MCCORMICK: He's here, I had coffee with him.

DR. KLEIN: You did, okay.

MR. MCCORMICK: Yes.

DR. KLEIN: Now you may remember there was, quite a while ago, a PowerPoint from him was distributed -- did we distribute his PowerPoint for this? You have all received it, and is it in the package here?

MR. MCCORMICK: No.

DR. KLEIN: It's not in the package, okay. But I'd say it was probably two months or so ago that his PowerPoints were distributed to the Committee, along with some other stuff, so you might have missed it.

And I believe you met him at the ITS World Congress in Vienna and he gave just a talk, kind of for Cisco Network perspective on ITS.

In addition, our very own Scott McCormick will give a talk on some of the security issues. Some of the PowerPoints we distributed in advance as well. So we'll hear both from Andreas Mai and Scott McCormick.

Scott, we may give a little -- we've got an hour and a half. We might not be a 50/50 split
if we get more --

MR. MCCORMICK: No worries.

DR. KLEIN: -- you know, gain more from our one brief interaction with Andreas.

We've got lunch, of course, and then subcommittee report out and discussion.

Notice that the last two sections, one is subcommittee report out and discussion. And the last session is advice memorandum discussion wrap-up. Really get focused on what we're doing.

These two are obviously quite closely related. What the subcommittees are reporting out and what the committee as a whole produces, in terms of a memorandum, are going to be intimately related. So I'm guessing there'll be a division, but somewhat there'll be a significant continuity between those two sections.

4:00 p.m., I know I have to be out of here pretty comfortably at 4:00. By comparison anyway, how many people have to leave early, earlier then 4:00? People catching planes and things like that?

(Show of hands.)

DR. KLEIN: Okay, that's actually a smaller number then I originally figured. One order of business, you may recall I've been talking about setting up a listserv for this group. But every meeting I say, I'm going to set up a listserv. Dammit, I'm going to set up a listserv. It's got to be a Yahoo Groups listserv, but it will be this Committee's own email discussion forum.

It is voluntary for you to subscribe, I hope you'll do it. And I will set it so that it is publicly archived. I think that's the requirement.

But we will -- I find it very cumbersome to keep track of these long email lists and I'm
never quite sure when I send out emails, which I almost never do because I don't quite trust the email lists.

I'm never sure, am I getting everybody, am I getting everybody plus another everybody? Am I getting 90 percent? So obviously a listserv would pretty useful for this Committee.

Hopefully it will not be too chatter-y. If it is, we're all grownups and you know, you can all send it to me, put it on whatever it is, you get it once a day or once a week. But a useful thing to have it.

So I will, what I'm going to do is send out, it's a little risky to do it by email today, so I might even circulate a sign-up. I think I have everybody's email address, but just put your name and, if you sign up to this it means that you are okay with being put on the listserv, let's put it that way.

And if you don't want to be on the listserv, that's cool. Don't sign up to the listserv.

Okay. I believe those are logistics for production. I know Bob's going to say a word, maybe more, on our culmination of our day. Perhaps the most important session. So, Bob, tell us about it.

CHAIR DENARO: All right. I just want to say we're going through the day and pointing toward the afternoon session, some of my expectation is I think it's good for all of us.

I'd like to nail down these various deliverables we've got. So we've got the overall memo, which I think is cruising along fine. I think that's well organized.

We have a new spectrum sharing memo we're talking about. I want just to get clarity on who owns that and who else is participating? I think we know that from yesterday's activity.

We have a memo on NHTSA, the proposed rulemaking. I want to understand who owns
that and who the helping people will be. So we're thinking about long-term for that, we'll talk
about that this afternoon.

And then we have a request from Ken. The first one is identical to our end of year memo, report to Congress.

But we have a strategic plan review. Again, who's going to own that, who wants to participate in that?

Deployment incentives report. Who owns that and is going to participate?

And then the last one we were kind of wrestling with, and we'll talk more about it this afternoon, this is DSRC implementation report. What do we think that would be?

Okay? So I just want to make sure, when we leave here today that we all have clarity on who owns what and what we're doing and we see a way to get it done.

The other thing I want to do before we break out is give some guidelines on these recommendations. So this exercise right now is talking about our final memo.

We've broken up into subcommittees addressing the topics that we all agreed we're going to address. And these subcommittees are to come up with the issues that they think we should present in the final memo and recommendations for those.

What I recommend as a format for that in the final deliverable, in the final memo, because I think we kind of evolved it over the last couple of committees and I like the way it ended up, is there would be three basic sections for each recommendation.

The first is a little bit of a intro and background on the problem. What's the background of this?

And when I say little, I mean little. A short paragraph, okay? So conciseness is
important here. So a little bit of background.

Second piece then is: what is the issue? Stating the issue. That's the last thing maybe in that intro and background, what the issue is.

And the recommendation. And those will be enumerated by memo or Recommendation 12, Recommendation 13, yada, yada. And then recommendation then is what we're saying addresses that issue.

So intro and background, define the issue and then the recommendation. So that's kind of the format I'm looking for.

So as you do your breakout, we want to look at it that way. And by the way, the reason for this, what I'm striving for here is clear communication between us and the JPO.

JPO has to respond to every one of our recommendations. So at least let's help them understand what the heck we're talking about. And that's the way to do it.

And it also helps to see where they're coming from. Where did that issue come from, what are we looking at?

Second point. Let's focus on the significant problems, okay. We're not going to give out trophies for the greatest quantity of recommendations, okay.

So let's focus on the significant issues. And what I mean by that, as you're meeting in your subcommittee, as you're discussing something, well, yes we could say something about or does it matter?

Let's really focus, let's have quality. Limit -- let's look for the substantive things that we can really come up with some recommendations.

And part of your selection criteria is, if you're going to come up with an issue, can you
figure out a recommendation for that? Now, I'm not saying avoid things where we don't know quite what to do say. Like, you know, you're kind of signed up to say something reasonable.

And what I'd like to avoid, and I don't want to get too prescriptive here, but to just say, this is really, really a serious area and JPO needs to do more research. I don't think we've helped.

What do you mean more research? Okay. That's a true statement perhaps, but where are the particular pieces of research you think they're missing.

And that's where it gets a little harder. That's where it gets a little harder because, and I'll say this again, I've said it many times. Our job is not to come up with answers.

We're not resolving the issue or whatever, we're making a recommendation of what needs to be done. But the more specific we can be, the more clearer it is.

And that's kind of defining the gap. We know you've done research in this area, others have done research in this area, but it potentially here's the gap that we're recommending they fill.

If you can go so far as to say, and by the way, here are some possible sources or resources, that would be helpful too. Not essential, but that would be helpful. But just make sure that when we're doing the recommendation, we can get as specific as possible.

Now, you may get to a particular issue and say, well we want to recommend the following research and someone on your subcommittee, or when you bring it back to the committee, might say: how do you know they haven't done that already? That's a valid question.

We're not going to help anybody if we recommend something that's already being well-researched and so forth. We've had several meetings now, a lot of information, so we should know that answer.

We had even a broader view of issues yesterday, but it's perfectly reasonable that we might
find there are some things that we're just not sure of.

We still have time to go back to the JPO and say, hey, here's an issue we're talking, we think there's a gap, but we're not sure about that, can you point us to somebody who can tell us what's been done in this area, and then we can, your subcommittee can have a phone conversation with that person or whatever, some follow-up, to see in fact if there is a gap there or not. Okay.

So, I want to make sure you understand that. That I think it's important for us to try to find things that truly are gaps. And in doing so you might need more information to do that.

Okay.

So any questions about that? Great, we're focused as clearly as I wanted to.

Now on the report-out. What I'd like to hear then, what is your set of issues, do you define. Okay. We have four issues, these are what they are.

I don't want us to have to read your entire info piece, but give us a couple of bullets. Verbally is fine, whatever, however you want to do it.

In the intro we're going to bring up these three points. Or whatever is leading us to defining this issue. So kind of like a framework on what the intro is.

And same thing on the recommendation. Here's our framework on the recommendation, we're going to say these three things or these two things about that.

And the exercise after we leave here is to go ahead and write the narrative on those. But for the purpose of us reviewing here to be efficient, just give us a couple of bullets on where you're going with that recommendation.

And then, as I said, what I would hope to do with respect to this overall memo is our next meeting, which we need to talk about yet, how many more meetings we want this year and when is
the next meeting? I would like us coming to the next meeting with everything final, ready to go.

Final committee review, let's get consensus and have it wrapped up. So that this year we can be on time. And I appreciate that.

I accept the criticism of the Committee and personally. Even though you were very gentle. But we do need to get, because we need to give them time to respond. And we all want to be on time.

So in the next meeting, like I said, it's one of achieving consensus, so we've got something that we think we're ready to go with. Yes?

MR. KIRBY: Bob, what's the deadline for this report? What's the schedule that we ought to be thinking about?

CHAIR DENARO: Well, we've said December-ish.

MR. KIRBY: December?

CHAIR DENARO: Yes.

MR. KIRBY: And they have to have their report by February?

MR. LEONARD: We have to submit to Congress February 1st.

CHAIR DENARO: Right.

MR. LEONARD: That really means, for us to get it to Congress by February 1st, I really have to have it by December 1st.

MR. KIRBY: December 1st?

MR. LEONARD: And that's giving us maybe two weeks to respond to your recommendation.

MR. KIRBY: Right.
MR. LEONARD: So if you have a lot of recommendations, I need --

MR. KIRBY: Better would be earlier then, wouldn't it?

MR. LEONARD: Yes, it would.

CHAIR DENARO: Yes, I mean and Tim said something earlier about so they can spend their holidays working on their response. I think we could be kind of doing that. So the earlier we can do it.

And that's why I'm saying if we can have this pretty well ready to go by next meeting, which may be summer, maybe at the latest, early fall, and if we can get it done by then that would be great.

MR. MCCORMICK: Valerie, did you find out when that V2X meeting was in September?

MS. BRIGGS: Oh, I didn't.

MR. MCCORMICK: Okay. I think it's the second week. I think it's the 10th, 11th, somewhere in there.

CHAIR DENARO: Okay.

MR. KENNER: And, Scott, that meeting was here?

MR. MCCORMICK: Yes. They had it in Chicago the last few years, but when I talked to Mike he said he was going to have it in D.C. this year.

MR. KENNER: Okay.

MR. MCCORMICK: I figured it would just be useful if we had our meeting, that timeframe would seem to work about right to get everything solidified for --

CHAIR DENARO: It could be, unless we choose to do two more meetings. But we can
talk about that.

MR. MCCORMICK: Okay.

CHAIR DENARO: But no, I like your suggestion. So just to be annoyingly repetitive, what I'm looking for out of the breakouts is: what are your issues, four, five, whatever it is. What are the few points you're going to make in your intro? What are your points that you're going to address in your recommendation?

Then we'll all hear that and we can have a little debate and so forth. Any questions?

Okay, now we've got to decide who goes where.

MR. MCCORMICK: I have a suggestion. I have sent the presentation out as a read-ahead --

CHAIR DENARO: Okay.

MR. MCCORMICK: -- to everybody in the Committee. So I can probably go through that very quickly in about five minutes and then we can transition somewhere else?

MR. GLASSCOCK: The phones are going to be moved here.

MR. MCCORMICK: Okay.

MR. GLASSCOCK: We're going to move the phone over here.

MR. MCCORMICK: Okay, never mind.

MR. GLASSCOCK: Because you're using the projector, right?

MR. MCCORMICK: I guess so.

MR. GLASSCOCK: And in the next room it's got a space.

MR. MCCORMICK: Thanks.

MR. GLASSCOCK: Okay. Or we can go downstairs.
MR. MCCORMICK: Okay.

MR. GLASSCOCK: Okay.

DR. KLEIN: Do you know if they showed up and the food is outside?

MR. GLASSCOCK: Water's here.

DR. KLEIN: Water is here, okay. Water is here. Good. We've got, Scott's going to be down there.

The Standards Committee and the Markets Implementation Committee will be here. That leaves Technology and the Outreach Communication, we don't have Kirk here and he's the leader of that.

So according to my record, George, Paula, Teresa's not here, Peter, Sonny's not here. Those were the members of that --

MR. CALABRESE: I'm on that.

DR. KLEIN: Oh, there you are. Okay. And Joe. So somebody's going to have to assume leadership for that for Kirk. So we have those to straighten out. So who wants to go downstairs in the --

MR. KISSINGER: We'll go downstairs.

DR. KLEIN: What's that?

MR. KISSINGER: We'll go downstairs.

DR. KLEIN: Okay, you're going downstairs? Technology will be in the next room over there. And, Scott, if you guys do finish up and whatever and you want to join, some of you come to our committee, for example, whatever, feel free to.

MR. MCCORMICK: Yes, we'll try to press through and join you.
DR. KLEIN: Okay.

MR. KISSINGER: Hey, Bob. Kind of a point of order, are these sort of newer requirements or --

CHAIR DENARO: I'm sorry.

MR. KISSINGER: The newer requirements and requests, I mean, are they going to be divided up by the existing subcommittees or are you forming new subcommittees?

CHAIR DENARO: We're going to discuss that when we come back afterwards on how we're going to tackle that. We can do it that way or we could create new subcommittees or -- so let's talk about that then. I don't know what we're going to do.

Okay. And please be back here at 10:30 sharp so we can finish up.

(Whereupon, the above-entitled matter went off the record at 8:29 a.m. and resumed at 10:31 a.m.)

PRESENTATION: THE INTERNET CARS: A CATALYST TO UNLOCK SOCIETAL BENEFITS OF TRANSPORTATION

CHAIR DENARO: All right, I think we want to get started. Hopefully our Committee members who just stepped out will be back in here soon.

So I'd like to introduce Andreas Mai, who very graciously agreed to come present to us.

And just a bit of background.

I saw Andreas present at the ITS World Congress in Vienna in last October, and I told him at the time I was very impressed with his presentation. My attitude about presentations is I'm often so disappointed that the most exciting thing about the presentation is the title.

And then when you're actually here you go, oh, he's not talking about what I thought it was
going to be. His was the opposite way around. It was very captivating and so forth.

And aside from the total story he had, he really had an interesting glimpse into how this is all going to work together, at least from Cisco's point of view, connecting.

So I talked to Andreas and asked him, you know, some of the things we're dealing with are this mix of traffic that we might have on our platform.

Being DSRCs for instance, but also cellular-based for mobility services and ultimately maybe various commercial location-based services. And in spite of that, or because of that, some of the security issues that we're facing; which, of course, we're dealing with very much.

So if he had any comments on those subjects I invited him to do that. So with that,

Andreas, I'll turn it over to you.

MR. MAI: Thank you so much for inviting me. I'm really excited to be here. I actually took it on me to come from Detroit to this place, beautiful place here in Washington.

And so I'm happy to be here and I hope I can give you some use and can distract you just a little bit from your typing on PCs and iPads and --

(Laughter.)

CHAIR DENARO: Andreas, let me just also say that this is a public meeting and a Federal Advisory Committee. So your comments are being recorded and will be in part of the transcript and that will be all. Just so you know that.

MS. BRIGGS: Fair warning.

MR. MAI: Let me just apologize.

What I would like to talk to you about is a little bit kind of how we believe we are really at the cusp of something big here and how the internet of cars, as we call it, is really a catalyst to a lot
of societal benefits of transportation.

But to start this off I wanted to talk to you a little bit about disruptive innovation. About 200 years ago, there was a lot of traffic going on in the cotton business between the United States and the rest of the world.

And at the time the owner of this ship was approached by his customer and the customer said, you need to do better than that. You need to innovate.

And it took them two generations and they innovated. So they came up with this. And so it was a big step forward, ships got bigger, more masts and everybody was happy.

But then another generation later they said, hey, you need to do better than that, this is not good enough. So do something, improve something. Well, and they came up with this.

And yet a couple of years later -- you know where I'm going with this, they really, really made a step in innovation forward and they did this. The problem was it's a hybrid.

And what they didn't see coming was this. Because if you were to judge the business of transporting goods with sailing cargo ships, you would never, on the grounds of economics, be able to make the case for this.

Because this is far more complex, this is far more costly. This has some many ramifications in terms of the supply chain of the fuel that you need for this.

So they overlooked it entirely. And those people that did not embrace this, were literally disrupted and put out of business.

And what I'm going to talk about today is really how, that we are really at the cusp of the internet of everything, is going to do this to the business of the government.

The DOT, the NHTSAs of this world, the business of the manufactures and the business
of insurance companies, in particular car insurance companies.

And last, but not least, the business of all our insurance providers. Because this is coming and it's going to disrupt and the question is, who is going to take advantage of it and who is going to be pushed out of the market.

This is a history of connections. And if you really think about it, it started way, way before this.

About 170 years ago we invented the telegraph, 100 years ago the radio, 70 years the first general-purpose computer. And then 40 years ago, just try to imagine this, 40 years ago then internet. And the World Wide Web was established just 20 years ago.

And what is happening right now is, we are connecting a lot of devices to the World Wide Web. You see here on the right-hand side, this is where we are at the cusp, we are also connecting vehicles.

And this is not where it's going to stop. This is where we believe the connections will increase exponentially. We will connect many, many things. And there are amazing things that will happen to our world that we live in if you connect the unconnected.

And it's about connecting intelligently connecting people, processes, data and things.

Which is going to transform many businesses that we know today.

It will allow us, if you look at what does it mean actually, intelligent connections, yes? It started off with simple connectivity.

I remember vividly the day when my wife said, hey, we've got this great thing in the office and you can send and you can get emails over your computer. And I said, what's that? Why would you need that?
Well, this is how it started. The next level was e-commerce. Digital supply chain and collaboration happens. So a lot of things became virtual.

The next level was social. Facebook. We had mobility, we had the cloud, we had video. We had Cisco with TelePresence suddenly make you sit in different rooms and you could experience as if you were sitting in the same room even though you were in different parts of the world.

And what is happening now is really the internet of everything. Connecting people, processes, data and things.

And what that does is it really creates tremendous opportunities, because you suddenly can create and expand into new markets. You can empower people to increase their efficiency.

You can create better experiences to create much, much closer relationships to your customers. And that's the big data element of it, you get deeper insights to make greater decisions.

And this is just the kind of the tee-up for what we are really about to talk about, how is this going to impact the world that you are advising the DOT of?

It's really about the internet also taking to the road. And it's about, and I don't know whether you saw this in report, but those among us who like Easter, those are little eggs.

But what this is going to do is it's going to increase the safety and security on our roads. It's going to allow for much, much better operational efficiency to run this system as a whole, it's going to create tremendously better travel experiences for all of us who drive in cars or public transportation.

And it also will allow a lot of revenue generation, but Bob asked me not to talk about money so much, so I took all of the money out of this presentation.
But what does it really mean? In our view it's a lot of government-driven policy. It starts with things like eco-drive and onboard safety and Driver Assist.

It goes on with insurance-incentivized driver behavior. I think we are going to see something like, pay how you drive.

And then we come to the topic dear to your heart, V2V safety and Driver Assist. I think this will play a major role as well. Smart road pricing, which will create a better demand/supply distribution.

Then after that I think they're going to talk about V2I. Local dynamic traffic management.

And then something that I adopt here, connected cybernetic traffic management. That's the ability to use all the data that you get to manage the system holistically over a larger regional scope.

The savior application is really, and this is how it effects the insurance industry, usage and behavior, crash prevention is the next line of frontier. The next line of frontier is going to be fast and correct response.

You see this already with cars in Europe, for instance. The next line of frontier will be claims and cost containment. And the next, and last one, which is always chuckled about is: I call it connected law enforcement, pay as you speed.

They're actually tests in Europe that were performed in Sweden, of all places. Where they did this, you didn't have to pay your licensing fees -- well, hang on, you paid your licensing fees at the beginning of the year and, depending on your driver behavior, you got a refund at the end of the year or you didn't.
But eventually I think, if we incentivized drivers for the way they drive, it will actually influence this by default. So as soon as you give them money for better behavior, you will eventually not need as much in law enforcement.

But according to our estimates, and we did a pretty deep analysis of what the cost base is of all of this, we believe that just in this use case there's a benefit of about $380 per vehicle, per year that can be generated.

It's also a nice illustration of how you need to change the processes after you connect. Because all of this requires significant process changes in the way insurance industries operate.

Starting here, they haven't even gotten -- and they do a little bit of there -- but they haven't even gotten to the entire extent of the value chain in the insurance business.

The next one is an interesting one. If you look at the U.S. road business, it sucks. If you look at the four million paved road miles that we have in the United States and say kind of what do public/private partnerships pay for a stretch of mile in Europe, in the U.S. in average, this is the price that I came up with.

So it's about $6.8 million, which translates into $27 trillion worth of assets for the U.S. road system.

If you then, say, round about all round numbers, you have available to you about a $100 billion fuel tax and tolls. This translates into return on assets of about 0.4 percent.

We would not be sitting here if our companies would make that much return. But it also means that we are sweating our assets for 250 years.

And if you kind of just let that sink in for a moment, I think at least for me it was an epiphany. I came to realize why this happens.
Why do I drive on Detroit roads and I just got my suspension replaced? $700 by the way.

And this is one of the reasons that I believe that if you connect vehicles, you suddenly have the ability to change the way we do business. You actually could implement a very smart road pricing system that charges you by the time of the day you've elected to drive.

That charges you by the number of people that are sitting in vehicles. We have those sensors on our vehicle. The seat sensors.

By the level of congestion I elect to drive in, by the speed I'm allowed to drive. And I got crude on that on, actually on the TRB -- who's chairing the TRB? It's a lady?

MR. MCCORMICK: Sandra Rosenbloom.

MR. MAI: Exactly. She grabbed me on that. I said, I would pay for the ability to drive from Detroit to Chicago at 170 miles per hour. And she said, this is so dangerous.

Yes, I said, okay, this is my heritage, yes? But it's really a question of, if there is nobody else on the road, you would obviously kind of open the flood gates for something like such. But I think it was a good example.

Weight, all weighing stations could be done with. Road type, if you elect to drive on a road that is in dire need of repair, you could automatically direct funds to this stretch of road. Because you know how many people have been driving there.

Fuel economy and emissions, the usual suspects. If we have ubiquitous connectivity of all vehicles, you can do this and it's not a very difficult undertaking.

I know, and I don't know whether any of the tolling community is in here. At the moment there are a lot of proprietary systems. There that may not be that much of an interest to get to ubiquitous connected vehicle, because all these systems would become obsolete.
For the automotive manufacturer, it's really kind of much, much closer to the example that I gave at the inception of this presentation. It's more like, oh my god, if I don't do something I may be out of business soon.

Because I think the next bit of ground is really from building cars to selling travel time well spent. It's not, the cars are all kind of from a functional perspective, pretty equal. From a design perspective, pretty equal. Marketing wise, you cannot do much for them.

Now Super Bowl ads say we've done this, you cannot do much more. This is where the battle is won. The experience part.

And you cannot pull this off alone because you need partners. You need to connect your value chain to partners who can deliver part of the promise that the customer, a modern customer, especially the next generation of customers will want.

And what does that mean in terms of business models? It's really kind of, and these are not randomly stacked, these are really by a kind of, their ability also to be monetized.

Connected to equal care, over the air update, remote diagnostics, customer stickiness in terms of customer relationship management. This is kind of the first and foremost objective of car manufacturers.

Connected safety and security. If I could get a system that would prevent my son from crashing my car, $5,000, by way of getting better messages, even retrofit messages in the vehicle that help him prevent imminent crashes, I would pay for it happily.

B2 customers or B2 consumers, business or government service platform. This is the service platform that could enable a lot of the services road pricing. For instance, the insurance element for the automobile.
Dynamic travel time optimizer. I intentionally selected this wording because it's all about saving time. This is the key thing for me.

I turn on my Waze today, sorry for all the guys who build navigation systems, but I get this application for free and it's really good. And on top of it, it warns me if there are policemen on the road, which I really like.

And only then we talk about infotainment and productivity. These are the smaller things that are taken for granted today. You cannot monetize this. This market has been spoken for.

And last, but not least, it's the total mobility cost optimizer. I think this something that is coming where people will find a way to reduce the cost of transportation, of personal transportation.

I will give you some examples on some of these next slides.

And then we also see the possibility from what is being done today. Today I buy a car, I lease a car. To more granular payment schemes that go down to micro payments.

And all of this from, and kind of bundled packages perspective to an on-demand perspective or from an investment perspective to a micro payments perspective, provides much more flexibility to offer new services in the industry.

And I think this is what is happening. And good examples for this are exactly on this page.

We just signed an agreement with Streetline. A company that facilities the finding of parking spots. It puts the infrastructure in place to find parking and to bridge the demand and supply in the parking arena.

There are others out there and this is just a subset of this. If you look around the globe there are extremely smart concepts popping up where companies, for instance, in events like
University of Michigan, big football game, people rent out their private parking spots for money.

And so you can park in their garage way and there's the marketplace where you can actually do this. So this is coming.

The other element of it is the mobility on demand. And this is the popular trend. It may not be so obvious here where we are, but it is much, much more obvious in other parts of the country.

And this is a chart that I stole from Kent Larson of MIT. He presented it on our meeting of the minds at some point.

But it's really kind of a nice way to demonstrate how this kind of connectivity can be used to, kind of again, smoothing out supply and demand.

So if you want to pick up a bike, in this example, it could be itself from vehicle or a vehicle, at a place with high demand and low vehicle stock. Well you would have a high price.

Low demand, a high vehicle stock, the pick up price would be very low. And the same effect at the destination.

But then comes the interesting part. And this is where the internet of everything comes in.

Then you could even connect it with an additional incentive of coupons of people who are at this point of destination, who know that you may want to get from this point to that point. They offer you an additional incentive to do this.

And these are things that are real. These are things that are happening. And this is, yet again, another example of how the internet of everything is going to change businesses.

And I talked about it, or I mentioned it before. For us, the cost of transportation and
communication in relation to our personal income, ranges between 12 and 17 percent in the
developed world.

If you go into the BRICs and more emerging parts of this world, this becomes
tremendously unaffordable. And we all know that the roads, the transportation systems are the
arteries of our economy.

If they are clogged, we cannot perform. And the calculation that I made here is, if you
would reduce the cost in these countries just to the world average of 24 percent, this would mean
that you could add a billion more vehicles to the world. You could make a billion more people at
least more mobile.

And this I think is where the opportunity lies. It's not about selling cars, it's about selling
mobility and reducing the cost of individuals to get access to the mobility market.

But, and this is the interesting thing for mobile service providers, if you have this
ubiquitous network and there's a lot of competition going on. We have companies like OnStar, we
have companies like Wireless Car and Agero and Ubiquity that are trying to get a piece of the cake.

But I think, quite frankly, those companies need to rethink their business model. Because
they are just not set up for the examples that I gave you earlier.

The companies that are best positioned today to take advantage of this are actually service
providers. Mobile service providers who could deliver us things like, hey the car needs gas, well
you should stop in the next five miles, there are three options for you. Here's the cheapest one and
the second one actually gives you the advantage that you can do the shopping that your wife asked
you to do as well. Or there's a friend sitting around the corner at Starbucks; would you like to send
her a text message and ask whether you can meet with her, yes. Would you like me to take you
there, yes. And the car would take you there.

These are things that can be pulled off by mobile service providers. And for them, and that's why I think Verizon paid $600 something million dollars for Hughes. It is not my call whether this was a wise decision. But for the mobile service providers, it's really increasing the number of users of mobile devices, the vehicle.

Increasing the uses that you and I and everybody can do with it and includes finally increasing the usage of their, kind of core business.

And for this, new funding models are necessary. And so I think we are very close.

AT&T just struck a deal with GM. Sprint is working with Chrysler on this.

It's really a question of how you make this happen that you actually deliver all these services. Connect to all these kind of opportunities to generate revenue with a pre-installed system where you have a couple of months of this service for free and where you then have the convenience of just clicking to purchase a particular service.

I think this is really where the model of the service provider is evolving to. And there's still a little bit of pulling.

It's the OEM kind of, who can command what share of the pie? What share stays with on OnStar, what share do they need to share at least, or give away potentially, to AT&T?

And then the fuel of the internet of cars is big data, analytics and prognostics. And I just kind of, this is just swipes on my part, where does the data come from?

It comes from telematics service providers, pay as you drive, EV clearing ITS and many, many more applications. And here at the bottom you see, okay, we potentially have a 300 million vehicles connected.
So 7,000 plus variables per vehicle, 24,000 variables for EVs. And the question is, well is this per day or is this per second? How often do we need this here?

So there's a big question here about pay as you drive. Just assume the third of the people would want to have lower insurance premiums, 100 trips per month, 500 plus variables.

Do they need per second, per month, yes. And I could continue this but there is a lot of data that is highly valuable that some folks will make the business on.

And if you talk data, I'm talking about a topic that I also know is very dear to all of our hearts here. And for reasons of disclosure I'm representing Cisco, but this is the example of what we believe smart connected vehicles are going to need in terms of data per month. So about 1.5 gigabit of data.

And the premium part of this is for infotainment and productivity. Smaller amounts are for the other services that I also mentioned early on.

But what that means is, in the context of what is happening in our airwaves, in one year, 2016 to 2017, the net amount of mobile traffic data is going to quadruple the total amount that we saw in 2012. So there's a ton of congestion today in our networks as we speak.

And by 2017 we're expecting about a 134 exabytes. Which is corresponding to, I think it's the easiest way, to about three trillion video clips of YouTube.

And that's a tremendous amount of data that is going through our airwaves. And that is why we have a problem. We have a problem as a nation, we have a problem even in the world.

There is a problem coming our way big time. Because this data explosion is going to create a bottleneck. And that is why the Wi-Fi Alliance, and this is actually a group of about 500 companies that have asked the question, can the five-gigahertz band be shared without causing
harmful interference to the primary users of ITS?

And in our view it's actually an opportunity. Because the FCC is going to validate if this is possible to the satisfaction of all shareholders.

And there's two possible outcomes. Outcome one is, well the spectrum is -- it doesn't work. Simply technologically not viable.

So the spectrum will remain with primary users because I think no one in his right mind would ever say, I take this away from you. And then somebody said, okay, and then you are responsible for all the crashes and all the congestion in the United States. And nobody would do this. And so I think this is just simply going to go away then.

But if, which we really, really hope for the benefit of all of us, if this works, it could be the foundation for the innovation and the faster deployment of this technology on the far, far broader scale and far, far faster path than we ever have anticipated. And a lot of the things that I showed before would be supported.

PROF. RAJKUMAR: Let me just ask a question if you will. I guess in our earlier discussion from yesterday, I guess there's U-NII-1, 2, 3, 4. The DSRC band for safety applications is really U-NII-4 to the far right of the spectrum if you will?

MR. MAI: Yes.

PROF. RAJKUMAR: So even if the answer is no, if you will, it's only part of the spectrum that is ready for wi-fi?

MR. MAI: Absolutely. So it's not all about the 5.9. It's a far broader spectrum that is being looked at because, another problem, and there are people here in the room that know this topic far, far better than I do, there are other frequencies that are used in a scattered fashion.
And the question is kind of, how can you rearrange this, reallocate them in some way to make it more efficient to use them? And that is going to be on V511.

PROF. RAJKUMAR: Have you talked quite a bit about dynamic frequency selection where, for example, these packets exist, picking different channels?

MR. MAI: Exactly. And this is, I think, what is currently going on. And as I say, with two possible outcomes in my view and if it is possible is actually good news.

And for that reason the aspect, if you look at connected vehicle kind of, we have connected homes. We also have connected offices.

What is missing right now is, and this is a far more complex problem, is connecting people while they are driving at high speeds on roads. And offloading data and switching will therefore be critical capabilities going forward.

Which brings me to the last portion of this. How can we unlock these societal benefits of connecting vehicles?

I think it's really a question of the ITS portion in the telematics world to go work hand in hand to make that happen. And it will be predicated, a little bit self-serving obviously, by an enterprise-grade network.

Now because the simple assumption is you would not want to have the network that connects your vehicle being less secure than what you grant yourself as an enterprise in your company. Now so it needs be at least equally as safe and secure as what you have in your enterprise.

But the other interesting portion of this, and this is just the enterprise-grade network, is key for this ITS infrastructure. I stole this from our transportation guys but I think there is a
convergence going on towards IP in the world.

I think it needs to happen in the ITS world as well. And it even goes down to the level of in the in-vehicle networks that will transition to IP.

But the internet of cars is a scale business. And this is an interesting kind of part to keep in mind. If you look at it in three axes.

If you say, okay we have various applications and we have safety and security, which is on everybody's mind right now. We have traffic management, we have road operations, we have road pricing, we have parking operations and these are just a couple of examples.

But you need one platform. You cannot create a dedicated system for this, for that, for that, for that.

The other thing you cannot do is you cannot create one for particular cities, particular states. And on the federal level.

The other element as well, you actually have different sets of customers. You have public customers. You may have business customers who actually would be willing to pay for a fraction of the data that you can collect.

And you also have private customers. Personal users that want to have traffic information for instance, they want to have other pieces of information.

And you actually need to create one platform that can support all of this. You cannot, if you elect to piecemeal this, it's going to cost you through the nose, it's going to create complexities that you will at some point find it very, very hard to unravel.

And the same applies if you want to make this a globally competitive business. And that's why I say those captive players, like OnStar, were the innovators in this market, absolutely.
But staying in the realm of GM, they will always be subscale. And if there are players, like the Verizons that just bought Hughes, if they play their cards right they can cover the entire industry.

The same here. You need the platform, you can support the TSP's business, the insurance business. Now we have players like Octo Telematics. They are trying to do this on the insurance side.

But at the same time you can use the same platform. ITS we talked about EV clearing and there are others that are emerging.

And this is really where Cisco's role is. We believe that we need an enter-in architecture from a network prospective that enables all these services.

We do not want to be the ones that compete with our most important customers, like Verizon or AT&T or OEMs or Tier-1s. We want to just provide the enabling technology which starts with a software client on a vehicle. Which goes on with the access point, the access layer, and it also continues here with, I need to say this, everybody here is talking about the cloud. So the clouds have arrived on the East Coast. But on the West Coast everybody is talking about fog.

And the fog idea is really coined by a colleague of mine, Claudio Borroni, who says, well if you think about this amount of data, if you think about latencies that are happening when all things are connected, you cannot always thumb the data up into the cloud and back from the cloud here. You need some form of intelligence on the edge of the network to make that happen.

Real life applications are for instance, natural language recognition. It could be safety, which I will go into next. Safety applications on a regional basis.

On top of this you need services that you deliver from the networking operating center.
For instance, to do connection management, to allow the vehicle to connect to various networks.

11-U, 11-P, Wi-Fi. AC is coming 3G, 4G. You need intelligence in the network that allows the vehicle to maintain the connection and to seamlessly switch from one to the other. And you need security, which I will talk to later on.

And last but not least, you need the cloud management aspect of it which is mission critical as many, many of the applications are evolved into the cloud.

But I wanted to use the opportunity to also speak about the security and why scaling is highly, highly important in this domain as well. It was a special request from Bob. It starts, it's actually an end to end approach that is necessary. It starts in the vehicle. A lot of things have been shown that nobody wanted to see in UCLA.

And what we believe is that you need a secure gateway to allow secure and privacy-preserving V2V networking. You also need this gateway to secure the V2I communications.

But, and this is important, you can protect the vehicles from the cloud. So you can delegate some of the heavy lifting of security into the cloud to provide updates, security updates, to provide access control, to protect against threats and many, many other things.

And I will talk about context next. You will then generate vehicle threat reports that will be processed here. And in return you will get vehicle threat updates.

And so you need this idea of remote updates for the security element as well. And then you need vehicle and credential identity and credential management that also can happen in the cloud.

And last, but not least, you need to detect misbehaving vehicles. You need be able to
pinpoint those vehicles that do something nasty and mark them as such.

And how important scale is is best illustrated on, there's this idea of fog. So some of these capabilities, while the bulk of the intelligence will reside here, need to be pushed back into the edge so that you have the local capability, the local updates and access points that allow you to secure vehicles.

Now that's one of the ways things that our team is working on together with NBS. But the context here is highly, highly important. And I think it's a concept that has not manifested itself.

But for this use case here, it's a question of, where is it happening? And so for instance, it's a server hosted in the Ukraine.

Who is doing it? The domain owner information. You know potentially who are the good guys, who are the bad guys.

It's the content. What is it? Is the content legitimate? How is it done? Is it the static or dynamic IP address and then when did it happen? And depending on what the result is, you can determine in this context whether there's actually malicious intent behind it.

And in our security intelligence operations, it actually currently covers about 35 percent of the global traffic. We basically scan all the information, about a terabyte of information, it's floating away, that is percolating through the network.

And an example of use case, is for instance, an agency headquartered in London identifies the email security identifies that there is a compromised server. The ISP in Moscow sees, well there's a botnet being stood up. The bank branch in Chicago sees the hacker is trying to get into my network. You would get this information into the operating center and in a matter of minutes it
would broadcast this out to the access points or to the vehicles to protect the vehicles.

Okay. And this is the kind of, again, for me a very good example of why scale is of

essence. You cannot do this on the city or on a state level. You need to do this on a federal level,

at least on a federal level.

Bringing us to the question of, how do we pull this off? It's a tremendous, it's a herculean

task.

And I think there is really kind of this whole area of internet of car services here illustrated

by those symbols and there's two key elements. The OBU and the RSU.

And I see a world where actually there will be a partner that says, hey, I'm going to

subsidize the onboard unit. I don't want you to build in the cheapest possible way to connect the

vehicle. I want to enable all these great services. And I need Wi-Fi for that, I need 4G for this, I

need DSRC for it and I want to have it all in one platform. And I give it to you for a discounted

price for the right to monetize the data and the services.

And I think there are players out there that have demonstrated an interest to do this, so I'm

very optimistic that there will be a way that more and more vehicles will be connected.

So the other element is, build and operate the Wi-Fi and DSRC network to monetize

offload and ITS and location-based services. Because for many of the ITS and location based

services, you need an infrastructure.

And the interesting example that I have shown before, and some of you, my apologies,

have seen this chart before. But this is actually DOT numbers that I used here.

One of the many estimates out there. I said okay, the investment to put the infrastructure

in place is about $6 billion. Repair/replacement about $600 million.
If you then say we depreciate over ten years you get to $660 million. Operating expenses were estimated to be around $440 million. So you get to about $1.1 billion cost of goods sold.

And if you then say, well we all want to make a little money, let's put a hypothetical margin of about 100 percent on top of it. So we get to a revenue that this business would need to operate this infrastructure at profit margin of 100 percent, of about $2.3 billion.

And the interesting calculation is, if you would spread this over the three trillion miles traveled in the United States, this would only mean a tenth of a cent you would need to pay, to put the infrastructure in place in the United States to the name of many, many of these use cases and give a tremendous economic impetus to the economy, with all the use cases that you enable.

This also is just a dollar per month, per vehicle that I would pay. I would happily pay this dollar.

This is kind of, I need to do this chart to kind of tee up the next one that I have.

We also did the back of the envelope calculation and said, hey, so if we would pick, just out of the federally funded bucket of road systems, the top 20 percent that are highly congested, that have a high propensity to crashes and that are in dire need of repair, this would, applying the same method I showed you a couple of chart slides earlier, translating into $1.3 trillion.

So keep this $1 trillion in mind. But this is really kind of how this entire presentation comes together in one shot. It is about integrating, sorry, it's about transforming the value chain.

For instance, automotive manufacturers. It's not done by, one example, by just getting the diagnostics data to the automotive manufacturer. You need to do something meaningful with it. You need to change the processes inside of an OEM to make sure that the data and the decisions that can be done are made based on the data that actually are executed.
At the same time you need to integrate the mobility value chain. So it's not done anymore just looking at the vehicle, it's kind of, we need to talk about the energy aspect of it.

The more we go into advanced technologies like electrification or HO2, it becomes important. Service providers, we talked about the role of mobile service providers.

The infrastructure providers, the roads. That's why I showed you the roads before. The entire ITS community.

And, last but not least, services we may not have even thought about that the world is going to invent for us. And it's all about, kind of what I started with, connecting people, connecting process, connecting data and connecting things.

With this I take a pause before I give you a little bit of dessert on the last slide to take some questions. Yes?

MR. ALBERT: Most of the discussions this group has had is regarding technology and with state policy. It seems like your presentation has a huge impact, possibly to the public sector re-engineering itself at an institutional level.

Can you speak to that? I mean is that kind of cost also included in your analysis or what might need to be done?

MR. MAI: Yes. I haven't dug that deep. I have to admit I just created the, let's say, the benefit portion of it. But you're absolutely right.

As it will require changes in the process of insurance companies, changes in the processes of the OEMs, it will also command changes in the way you operate roads, you operate inside of the DOT.

And I think it's a question of prioritizing the areas where you get the biggest bang for the
buck. And then start with one or two pilots to say, hey, let's do it here, let's validate that it can be
done in a controlled environment and replicate it.

DR. KLEIN: This is kind of an elaboration of what he said, but this is a complex, rich,
macro-vision of the total environment, sort of, ecology. It's not even a system it's more than a
system, it's an ecology.

Some parts will, creating, implementing, developing or whatever you want to call it, is
going to be a challenge and it will be somewhat of an organic process undoubtedly.

Some areas may rapidly move forward. Others, no matter how much you entreat them to
move forward, they may not move forward. And it's hard to say. In differently countries, it will
behave differently.

Do you see, have you looked at it enough to have identified any real strategic potential
bottlenecks? Like we realize it will be uneven but we know this has to be done, this has to be
done. Are there any places where there are real, the crucial nodes in this ecology?

MR. MAI: Yes, absolutely. And that's my dessert. So if I can park this question until
we have done, I will answer it.

DR. KLEIN: Yes.

MR. KISSINGER: One of the safety guys, and then I'll pick up on Sandra Rosenbloom,
that initial passage. If you were able and just food for thought, you're able to transform this from
cost to speed or price to speed to create not to speed, you might save a $100 billion a year
associated with economic growth, a $100 billion in capital.

MR. MAI: To help you understand this again. If you prevent --

MR. KISSINGER: It's 30 percent.
MR. MAI: -- them from speeding or?

MR. KISSINGER: Yes, if you were to pay not to speed as opposed to pay to speed.

Because most estimates it's about a third of the factor in serious injuries and deaths and conservatively $300 billion a year associated to that cost.

MR. MAI: I could see this, but I would need to see the data.

CHAIR DENARO: Andreas, a lot of this is about the value of the data, the big data that you talked about there and how that could change business models, buying down equipment and everything else. The major assumption there is that we find a way past the privacy issue problem.

And I'd agree other people say, hey we don't have privacy today, our phones are being tracked. That's all true, but that doesn't mean the perception still isn't the problem.

What are your thoughts on how we navigate our way through the privacy concerns with the general public?

MR. MAI: I may have a little kind of different opinion on privacy than most of the people that far more knowledgeable then I am on this topic. But I think if you look at the phenomenon of Facebook. If you look at the phenomenon if you get an app and you want to take advantage of some features, you need to give away your privacy. You sign off your privacy.

If you look at companies like OnStar, who make it part of the terms and conditions that you allow them to use the data that you get from the vehicle. So you sign off your soul, so to say, to take advantage of these services that GM can then provide.

I think it will eventually, if the consumer, if whoever buys the thing has the right or gets rid of the right to use the data that comes with the thing, be it the vehicle or anything else, to somebody who promises and delivers a value with this data, I think it's going to play out on its own.
Because like for instance, if I get an advantage from GM, for example, would offer me, hey you get 20 percent less cost of servicing your vehicle if you give me your data. Would I do it, yes.

Or, you get the most accurate traffic information if you also invest your data into the pool of knowledge, would you do it? I would. Or if you give like Waze does, certain message.

And the insurance example is another good example. There are people that cannot afford to drive a car. If you would offer them, hey, I give you, if you drive nicely I give you 30 percent less in insurance premium, who wouldn't do it?

I don't know who of you has an adolescent kid that is just starting to drive, you pay through the nose for the insurance premiums. Well if I could find contract that says, if you give the driver data, a driver behavior data of your son to me, I will charge him not what I'm charging everybody else, I will charge him exactly the way he drives. I would sign for it.

And I think these are just a couple of examples where I see this is going to play out on its own.

CHAIR DENARO: So you expect the opt-in but you believe that benefits like that will evolve to a point where it's not an issue?

MR. MAI: Yes.

CHAIR DENARO: Okay, makes sense.

DR. KLEIN: And that can vary from sector to sector, I'm guessing. Different sub-zones within the overall ecology probably have different levels of privacy. Because the public sector is a lot more sensitive to privacy than the private sector.

MR. MAI: And you need to have the toggles inside of the system to protect the privacy.
But at the same time you need to have the flexibility if there's value in, kind of delivering part of your data for you and for the society, potentially, to kind of opt out or opt in as your colleague put it.

PROF. RAJKUMAR: Yes, you presented a very broad mission for data ecosystem, as Hans pointed out. So previous, you also then shared there are multiple players in Europe like companies like Cisco, maybe new startups and then existing companies out there, I mean where the government also has to play a role.

MR. MAI: Yes.

PROF. RAJKUMAR: And then this committee here, I guess, has the charge of forwarding some recommendations to the government. Clearly that's the cooperation between the public sector and the private sector.

So what role do you think this company could play in fact that, specially that data process if you will?

MR. MAI: Absolutely. And that's part of the dessert, so that's the second part of the dessert.

MR. KIRBY: This whole opt in/opt out privacy and all of that.

MR. MAI: Yes.

MR. KIRBY: We've done some studies and public acceptability of road pricing concepts, okay.

MR. MAI: Yes.

MR. KIRBY: And the bottom line is, if they can opt in and opt out they're fine with it.

But if they can't opt out, they don't like it.
And so if you have some sort of government-imposed pricing system that's going to be used to gather your information and price and you can't get out, there's a different level of receptivity to that then, so that sort of things you're talking about where you can choose this provider, that provider, cut this one off next month if you don't want them.

MR. MAI: Yes.

MR. KIRBY: There's two different worlds there.

MR. MAI: Absolutely. No and I, part of the dessert, I will address that too.

MR. KIRBY: Okay.

MR. MAI: So now I guess --

(Laughter.)

MR. MAI: So any other questions before I show the last two pages? The dessert. No, okay.

Food for thought. This was really for this audience. I think it all starts with policy. Because we are at a gridlock situation right now where kind of, will we or will we not provide communication-enabled -- I intentionally don't say DSRC -- communication-enabled crash prevention technology?

And I think this is where it all starts. Europeans, as most of you may know, have signed their memorandum of understanding that they will put DSRC on their vehicles starting model year 2016.

So I think it's going to be just a question of time until this ripples over to the United States. The question is, do we want to follow or do we want to lead?

And I think this is where it all starts. So crash prevention, putting more safety on our
roads, connecting the vehicles for that purpose is where it starts.

The second thing is penetration. There's always a big debate about how do we make sure that we get enough critical mass in the vehicle population?

Well what if you would say you don't need to pay licensing fees? If you put an onboard unit on your vehicle that does a subset off what an embedded solution can do, and if you opt in, to your point, if you have the choice, we don't force you. But if you want this, you get the benefit, partial benefit of this and you get more.

And here's what you get more. You could actually then say, well and then you have another option.

You don't have to pay fuel tax anymore. If you opt in to kind of pay a vehicle mile travel tax, that's an option for you.

And we will refund the fuel tax. I know it's difficult, but I have a solution for that, hopefully, as well.

Even if this were a wash and only, whatever, 30 percent of people would opt in, you would have a far, far more efficient, and you would have a critical mass, a base, to actually justify the investment of an agency that manages this.

The next element would be, well guess what, this same onboard unit could actually provide enough penetration in the vehicle population to make it worthwhile for insurance industries to offer the pay as you drive, pay how you drive policies on a broader scale.

Is there a role for policy? Potentially. In the sense of, you should only charge the customer according to his driving behavior and not as a kind of part of the big, big pool of good drivers and bad drivers.
So that would also be possible. At the same time you could divert, and that's why I showed you the one-tenth of a cent, a fraction of this to build out the extra infrastructure. To fund the infrastructure for that purpose.

And you could also use this onboard unit for wireless payments. So if I, and again, it's a business some people would be highly interested in.

If you and if you would only start with a fuel consumption or energy consumption and you would allow somebody to kind of wirelessly charge whenever I refill my car. I never ever have to put in my credit card again. You can manage this. You drive up, you refill your car and you drive away.

And then this entity would be able to facilitate the refund of fuel tax much, much more easily than before. And I just didn't want to forget that.

And if you say, we are only able to do this for a third of our U.S. car population. Another chart that I didn't show that I hid was, you generate about $1,400 per vehicle per year in benefits.

If you say, well let's kind of extrapolate this to a third of the vehicle population, this is where you get to a $110 billion of economic value.

The other element we shouldn't forget, and that's why I showed you the chart with the 20 percent of road, you could actually, from the infrastructure side, this is the $1.3 trillion that you saw before, you could infuse this into a public/private partnership and create a, be the impetus. Be the, let's say, the foundation for another business in the United States.

Just to give you an example. Privatize our roads and PPPs, in Europe are about 34 percent of the road system. Do you know the corresponding, you should know the corresponding number in the United States?
MR. KIRBY: Very, very small.

MR. MAI: Three percent.

MS. HAMMOND: What was that?

MR. MAI: Three percent.

MS. HAMMOND: Of what?

MR. MAI: Three percent of the road system in the United States is either privatized or in public-private partnerships or toll roads, three percent.

(Simultaneous speaking.)

MR. MAI: Even if it's five percent, and three percent is the number that I found, it's very, very low. So if you created this and did another, and this again is policy-driven, you could actually, and I didn't show this chart either, in light of time.

We need $270 billion to maintain our roads in the United States. At the moment we only have around about $100 billion available to us. So this is how I got to this number.

So if this public-private partnership would only come into being for the requirement, hey, you need to chip in the private portion of it, which is kind of closing the gap of what we need to actually bring our road system up to standard.

And then the government would pay a fuel tax share. Depending on how this plays out, how many people opt in. The others still pay fuel tax. And so the U.S. government would pay a price, and you would also be able to have a recurring revenue stream out of the VMT for these people that manage the roads.

And you could actually do it in a way with a toll booth. The vehicle drives on a particular road stretch that is part of this PPP concept and something is being charged.
what it would allow you, given that you have a recurring revenue stream, it would allow you
actually to position this, yet another industry, to position this as road infrastructure rates with a
pretty continuous and secure income stream in the financial market. And so you could create the
business of infrastructure rates.

Typically, and that's again, it's a number from Europe. If you privatize roads, the average
savings for both investment and for operations of these costs ranges between 15 to 20 percent.

In this reading example, just one year, if you did it for this subset of roads, one year of
savings would again allow you -- you remember the $6 billion of the road infrastructure -- to
actually put this roadside infrastructure into place.

MS. HAMMOND: Where does that statistic come from?

MR. MAI: It's from a report that, consultancy, I forgot which one did, assessed all the
PPPs in Europe. I have that somewhere on my -- but I did this three years ago. And the bottom
line of this is really that as you can imagine, all the things that I showed you in the presentation
before would more or less be enabled by this.

And so you suddenly have the infrastructure to connect vehicles, and if you take this as a
proxy for GDP and apply a very conservative job elasticity factor of 0.3, this would translate into
550,000 jobs, which does not include the financial part of the business.

It's just the kind of shovel-ready, shouldn't mention that, shovel-ready contribution, which
would be 550,000 jobs. It would also allow you to potentially retire $1.3 trillion worth of debt, and
shorten the budget for the corresponding road stretch that you put into this public-private
partnership pool by $20 billion to $30 billion.

Now answering your question regarding, really, who can make it happen, there's so many
stakeholders. And I try to think hard about who are really the key folks that can make it happen.

And that's Raj's question.

I think these are the guys that can make it happen. The other model industry, first and foremost, because this is where everything starts, it starts with the vehicle. The service provider is very important because they provide the connectivity, and I think in the long run the best positioned strategic players in this whole telematics, and location are satisfied.

The insurance industry, because it's one of the premier use cases where everyone in this room can see immediate benefit of their annual cost for insurance premiums.

It's the government for the policy, this is my trillion-dollar chart before, the government that needs to put the right policies in place and not to forget the infrastructure players here.

If you look at these companies, many of these are in Europe because in the U.S. there is no private road business. You could spawn this business with some of this pretty easily.

And last but not least, all the people sitting here in this room representing the RTS, and the smart connected vehicle folks as well.

MR. MCCORMICK: You're on my board, come on.

MR. MAI: Good. No, but this was the dessert. This is all I had to prepare for you today. There is much, much more, but any questions?

MR. CALABRESE: Where's the money coming from? You can't save money and invest more money. So the money we're saving on insurance premium is going to go back to the funding of more infrastructure, is that -- I mean, where's the -- what's the impact of the --

MR. MAI: The flow of money, I'm working on that now. I have a pretty sophisticated model already, but I need another three months to finish it.
MR. CALABRESE: But obviously we're paying more money than in a different way, and some of that could be by savings.

MR. MAI: It's a functional flow. It's cost savings, yes, so the avoidance of cost. And there's hard costs and there's soft costs. Hard costs is, for instance, if you have a more diagnostics and prognostics you can save in the order of $100 and $200 per vehicle per year.

That's the hard cost, but it's only a hard cost if a company like an auto manufacturer changes the processes and lets the people go who were working before in an inefficient way, and also kind of act on these findings. So that's I would call it the hard cost savings.

If you say well, we reduce congestion. You have less pollution. You have less fuel wasted in traffic. I would call this, it's hard/soft, make a call. But then you have the revenue, gross margin generating aspect where you actually sell services to people who buy media content, who buy traffic information, who buy the box for retrofitting vehicles. That's gross margin increment for the industry.

Now in this flow of money, actually I'm working on a couple of customers right now to really see, okay, who, kind of how does it start? Who's paying for what and who is gaining from the other side?

MR. STEENMAN: In your view, what is the thing that will ignite it? Because if you look at even your bigger picture, I mean with the somewhat limited number of things you have on that, that's still like a lot of players you have to align.

And to put that in place is a tremendous amount of workflow, procedural changes, infrastructure changes that are all coming into existence all at once. So the problem with this though is how and where do you start it? Because what you don't have in here is the time lag.
This could take ten years to put in place. It depends. Well, let's say five years. There's the time

element involved that you don't see here.

MR. MAI: I truly believe it really depends on how the policy is being set. If you set a

policy framework that makes it palatable to a broader portion of the vehicle driving population to
take this journey with you, if there's a smart way to frame this policy, I think this is where it all

starts.

MR. STEENMAN: Sure, but it starts with the onboard units.

MR. MAI: It starts with the onboard units.

MR. STEENMAN: And that enables everything else.

MR. MAI: Absolutely. This is where it starts, and then gradually you need to find a way
to divert purposefully money out of this pool to kind of --

MR. STEENMAN: I think because the rest of it is based, it depends on diversion of

money and reallocation.

MR. MAI: Exactly. And if you go, for instance, connectivity into vehicles, I believe it

will not be just DSRC, it will 4G and it will be Wi-Fi. And then suddenly you can enable a lot of

the other services that --

MR. STEENMAN: So that's the whole problem, it's just like we've been talking about

this for ten years and we still don't have units in cars. I guess the question though is how do we get

a reasonable amount and a relative number of units in cars?

MR. MAI: You need to give a reason that communication is going into the vehicle. I

see the most prominent reasons to be safety. This is one to protect everybody's life on our roads

better than we can do today. And it's the congestion element and the road, kind of we
need to pave our roads. We cannot continue like this. So the money has to come from somewhere. And that's why I say this is the second thing.

So if you accept this for a moment as an absolute must, we need to. We cannot afford to continue like this. In particular, here on the road-pricing side, where do you want to get the money?

MR. KIRBY: But that's the issue, because why is anyone going to opt in to pay for it? It has to be a lot more than they're paying now. They're paying two cents a mile, roughly, gas taxes. And it's paying those if we go fill up at a pump. There's no fuel monthly bill or anything like that.

Why would anyone opt for a VMT fee which has got administrative costs associated with it, we've got to pay the bill. And you should, I mean we've got to get more per mile out of road users. So there's nothing to give away is the problem. There's nothing There's no incentive to give.

MR. MAI: Well, even if it were a wash, if you would say I replace fuel with a VMT, even then you would have a positive effect.

MR. KIRBY: Do you -- I doubt that very much, because there are going to be administrative costs associated with the VMT fees. And in any event, you know, there's no value to a wash. I mean we're better off where we are than charging for the same amount by a more expensive method.

MR. MAI: Can you attach a cost to what it costs today to collect the fuel tax on all levels?

MR. KIRBY: It's relatively modest. So it goes back to the, you know, it's a very efficient way of collecting revenue, more efficient than almost any VMT fee we can come up with.
MR. MAI: My mission today was to kind of start with the sailboats and to give you some food for thought. You are far, far better suited in, oh, a lot of the constraints. I just wanted to give you food for thought.

MR. STEENMAN: In all your research, and maybe it's because there's more privatized roads, but you answer it. Why is the road structure in Europe so much better and higher quality than it is in the United States? What are they doing different?

MR. MAI: I think it's a function of two things. A), they spend more money. And B), if you look at it there's a lot more toll collecting schemes. There's a lot of road pricing schemes that have been implemented. I just yesterday saw the order of a very good company in Austria that will outfit all the Austrian roads with Wi-Fi. And --

MR. STEENMAN: I mean Germany has some of the best roads and there aren't any toll roads.

MR. MAI: Well, that's actually a third element. I came from Germany, as you undoubtedly know, about 13 years ago maybe, and I was just shocked to see the roads here. Because there I could drive very fast and it was just nice smooth ride, and I drive in Michigan and it's -- mama mia, that's why I couldn't drive a small car.

But there's a different way of building the roads also in Germany, a significantly different way. If you look at the way they build roads in Europe, it's far more sophisticated than they do here. And I think there even were studies that were performed, even in Michigan, where they compared this, and the unions were all up in arms. No, this cannot be done and it's, but there's also --

MR. MCCORMICK: You're talking about the concrete and asphalt lobbies that were,
announced it because --

(Simultaneous speaking.)

MR. MAI: Yes, so I think it's these three factors.

(Simultaneous speaking.)

CHAIR DENARO: You know, we're dealing, that DOT has this program going for us looking at vehicle-to-vehicle communications and that's important.

As we consider a single OBU, and I like your idea of we've got all these different functions. I once used to present a chart where I found ten uses of GPS in a vehicle. So the traffic guys went GPS, and the nav guys went GPS, and the safety guys went GPS, and the V2V guys went GPS, and I counted nine of them.

And as I went through my business of talking to each of these communities about why don't you get together and create one OBU, and if enough of you who are not used to this thing, the possibility of buying it down to zero was certainly there.

And the answer I kept getting was, we've got enough time, enough trouble getting coordinated within our own industry. We can't worry about somebody else. And so I had this car I used to present where I showed nine shark-fin antennas on top of it because we're going to have to nine GPSs, I guess.

But my question is, as we open up this, let's say we do get to an integrated OBU and it serves all these different functions. If we're just doing DSRC vehicle-to-vehicle safety, that's challenging.

But there as we open it up to more and more public and other kinds of access, more paths in and out of the vehicle, we now increase the vulnerability and security issue, hacks and so forth.
If my bank account gets hacked it's a bad day and, you know, maybe there's insurance and so forth. If my car gets hacked and slams on the brakes and a family of four in back of me crashes into me, that's a whole other level of concern.

Are you convinced, your company, and you personally, that this is a tractable problem in terms of achieving levels of security that we need for this kind of application? If somebody would open it up more or less.

MR. MAI: Yes, I heard two questions. Let me answer the first one first, it's a question of proliferation of devices. And kind of everybody is looking in his own world.

This is kind of similar, you talked about GPS, yes, I'm talking about audio telematics, satellite radio navigation, insurance dollar, that's for the pay as you drive, Wi-Fi on board, ITS/DSRC, and the tolling and the parking element.

And if you look at all of these devices, and these are just rough order of managing costs when we're talking about $400, and if you operate this, about $600. And our kind of hypothesis is that we can save a tremendous amount by creating the one platform that kind of allows you to, from a software perspective, support all of these.

You have one, but you need to have a more powerful ECU, and then if you get into the discussions with OEMs they say, oh no, no, it needs to be right size. We can only put in a two-core and that's the maximum that we can put in. But I think eventually you cannot afford a car that has less brainpower than the smartphone that I bring at the time --

(Off microphone comments)

MR. MAI: The second part of your question was really going back to this chart. That we think it is kind of the single gateway concept, which is the one line of defense. It's this one
secure gateway that where all the communications need to go through, which actually always has
the latest and greatest protection capabilities updated from the car. So it needs to be a
tandem of what's happening there and there, and to the extent you need to create local hubs, you
need to push some intelligence of the security to the edge of the network.

And this is really kind of -- but at the moment you have the solution where you build in
the wireless, you have some wireless sensors in the vehicle, you have the 4G and you may have the
DSRC.

All of these systems are separate and want to protect themselves against the outside world
in a separate way. Will not work. You need to have the one line of defense that is always up to
speed.

DR. KLEIN: I'm the resident social scientist professor on this group, so let me ask.

Take this technological system and transfer it. Think of it in terms of all the different communities
and groups that are out there. You kind of did that. You mapped out the different industries and
so on.

Now for any one of these industries, for instance, I go to ITS America, ITS World
Congress, TRB, I go to the meetings here, and somehow I feel like I'm not fully part of the total
conversation and social interaction and exchange of ideas that's necessary to understand the world
that you presented to us.

Where else should I be going to try to understand, to meet the other parties and to interact
with them and try to build those communication links or interactions that are the prerequisite for
developing a system like this?

MR. MAI: I think there is not such an entity. I just haven't seen it.
DR. KLEIN: Do you go to Mobile World Congress, is that an essential conference for you?

MR. MAI: It is an essential conference for CISCO as a company because our new customers go there. Absolutely, and so Mobile World Congress is one. Another one is obviously everything ITS.

But these are all the usual suspects that you already mentioned too. It's the auto alliance here that kind of, where the -- are represented. We have corresponding entities in Europe.

And I think the challenge that I see is you need to get the right folks together, and it was my kind of attempt here at the end with the last chart here, who are the key stakeholders in all of this.

I think you need to have representation of these folks to actually get to the, okay, what's the most tangible, immediate pilot that we can kind of launch together to make this real? But I actually believe it starts with policy making because we are at this junction. There needs to be this kind of little notch that connectivity will be built into vehicles and will be part of how we manage transportation going forward.

PROF. RAJKUMAR: Andreas, this might be a different take on Adam's question. That is, you talked about time being of care, but I also kind of see of logical dependencies perhaps, between the various elements the broad mission that we have. We have probably done this exercise, which depends on which, and which is the first one we strike before the chain of dominos falls?

MR. MAI: This is really kind of where I try to pull out this slide. It's really the kind of, and you can, these are interchangeable. But I think this is where it really starts. You essentially
have to force feed it to some extent that if you want connectivity on vehicles to enable all these services.

MR. STEENMAN: But you could argue -- I don't know if you thought about that so forget V2V. Think about all the connectivity that's going to be in vehicles kind of 2012 going forward where every car is basically connected. It's just not connected through a DSRC thing. Wouldn't you solve all of that with connectivity that's in the car today?

MR. MAI: It is like, in particular, when you talk about security which is an issue in --

MR. STEENMAN: Not just brought in, but most cars makers are putting SIM cards in their the cars nowadays.

MR. MAI: That's right. But some of the, let's say at least in the safety arena, critical use cases cannot be supported with traditional --

MR. STEENMAN: Right.

MR. MAI: -- Wi-Fi, no. I'm sorry, Wi-Fi or --

MR. STEENMAN: But everything else can.

MR. MAI: -- 4G. Everything else, and then that's what I say. I'm not saying that there is, I'm not making the case where there needs to be DSRC and that's the only thing. My case is more, connectivity needs to be agnostic to whether it's DSRC. The vehicle needs to be able to connect to all of the above, DSRC, Wi-Fi, 3G/4G. It just needs to, because you will, by default you will drive through regions where you don't have one or the other. So that's Hypothesis Number 1.

Hypothesis Number 2 is, you cannot make a business case just from one use case prospective. Even a kind of domain of use cases like safety will not be sufficient to make a strong
business case for vehicle connectivity, so multiple use cases.

And the other element is, there's no single entity that can pull this off. It needs to be a concert of multiple interested stakeholders that make this happen. So there needs to be a discussion with the other industry of this --

I'll give you another example, and for me this was eye-opening. I had a discussion with an old friend at Qualcomm who used to be with GM, Chris Borroni-Bird. And we were having lunch and we discussed the possibility of well, what if we would put inductive charging capabilities in high occupancy lanes? And this will allow us to reduce the battery packages in electric vehicles tremendously, and you would make these lanes exclusive to those that have this capability.

We would be advancing our transport system tremendously, and at the same time we could put DSRC on those vehicles, which would allow us to do the tuning and up to quintuple capacity of this high occupancy lane.

And so we thought about it, and things like this suddenly become possible. And I think, again it would be a combination of the idea of electrification and DSRC for a completely different use case.

But the prerequisite of this is you have vehicle -- and then people would actually ask for 3G and 4G or Wi-Fi capability because they would say, hey, suddenly I can actually look on the way to, or I can surf and shop and whatever.

MR. STEENMAN: So it's kind of your hypothesis given this policy-driven and regulated, then the government has a stake so they can solve a lot of the money flow problems to roads and tolling and gas taxes, because they have created the comprehensive policy framework that's the safety, double the towing, intending things and that is enough to your point as to first
MR. MAI: Exactly. That's the first domino. And then if you then enable use cases, if you have this as a given, connectivity is a given, and suddenly vehicles can do it, then people will automatically demand more. I want to do more. I want to have connectivity like I do have at home to my vehicle.

And then people can suddenly come up with a parking market, and what is it, 11 to 23 percent of city traffic is people looking for parking. This has a tremendous impact on how congested cities are and how much fuel is wasted. And I think this is all predicated under the assumption vehicles have connectivity and can you make use of it.

CHAIR DENARO: Andreas, I want to thank you very much for coming and presenting today. Will you be able to provide us a copy of your presentation?

MR. MAI: Most of it, yes.

CHAIR DENARO: Okay. If you would sort out what you can leave, that would be great. And we're going to break for lunch. We ordered from downstairs. You're welcome to stay and join the lunch. I assume that you'll have to go down --

(Simultaneous speaking.)

CHAIR DENARO: Okay. All right.

MR. MAI: I'm happy staying for lunch. Thanks again.

CHAIR DENARO: Okay, so we'll break for lunch. Is it outside? Okay, we're going to bring it in. All right.

(Whereupon, the foregoing matter went off the record at 11:57 a.m. and went back on the record at 1:03 p.m.)
CHAIR DENARO: All right. What we're going to do is, according to the agenda, we're going to do sub-committee report outs and discussion it says.

And then, as Hans said earlier, that leads into advice, memorandum, discussion, and wrap-up. And it's more than that because we also want to talk about the spectrum memo, the NHTSA memo, and what we're going to do for Ken's request as well.

So we'll go through by subcommittee. What I'd like you to do is talk about, as I said earlier, what are the limited number of issues you're choosing, a few bullets, either verbally or otherwise on background, the issue, and a few bullets on what the recommendation might look like.

I'd like this to be interactive. I know it's after lunch, and we just had a brownie, or lemon cake, or whatever. But I'd really like each of us to challenge each other either on what we're presenting, or what we've omitted, and so forth.

I will admit, and I'll represent the Technology Subcommittee, I'm not confident that we've identified all the right things at all. So I'm very, very open to other suggestions.

The reason I'm saying this is because I want to get as far as we can today, pretty much being in agreement that this is our list, whatever it comes up with. We have 14 recommendations, or whatever.

So that the next phase, when we all go away and write this up in text and then circulate
that memo, no one's surprised. We're kind of there.

Because my experience is it's a lot easier to get consensus when we're all sitting here
together than it is over the emails.

And what happened to me in December is I kept getting, oh, by the way here's a couple of
comments. And, oh, by the way, here's a couple of more comments.

And it never stopped. I couldn't find a way to stop it. So that's why I'm suggesting that
let's try to get as far as we can face to face.

MR. STEENMAN: It seems like we are right now down to less than half of the
committee.

PRESENTATION: IN FAVOR OF ITS PAC ADVOCACY OF CONNECTED VEHICLE
RULE MAKING

CHAIR DENARO: Well, that's good and bad. It's good that we'll be productive. It's
bad in that what I just said is not going to work for those who are not here.

So you're saying I'm condemned for the same anywhere. I get it. All right. Anyway,
before Scott goes into his report out, he does have a couple of presentations that you all would like.

MR. MCCORMICK: I have a three-page PowerPoint here. And I'm going to volunteer
to draft the deployment advocacy wording that we could then talk about later.

Passenger vehicle safety messages, everyone knows you're going to consider whether to
pursue a rule making to require the safety messages be transmitted in 2013.

The decision could be delayed by the appointment of Secretary LaHood's replacement, or
not. They give you the liability, technology, feasibility, implementation issues. This decision
could take as many as the five years.
Major vehicle safety technologies typically have been available and in use on new vehicles sometimes for years before they become mandatory safety standards.

The decision, whether by Congress or DOT, to require these systems has essentially been aimed at taking proven safety technologies and expanding its existing use across the new vehicle fleet.

The decision to regulate connected vehicle technology presents a contrasting situation in which the regulatory decision will likely be based on proof of concept and pilot programs, such as the safety pilot, rather than incorporating the safety technology that's already in use into a mandatory standard.

Given that, the ITS PAC, in my opinion, should still advocate for the rule making to go forward. However, I think there's a much greater opportunity in front of us.

But how it works, and NHTSA has brought enforcement authority including recall that extends to vehicles in use. The agency regulates the safety of new vehicles and original equipment, there's rule making, et cetera.

Federal Motor Carrier Safety Administration's authorized to prescribe commercial vehicle usage requirements including vehicle operator requirements, drug testing, hours of operation, et cetera, et cetera.

In 2014, NHTSA and FMCSA will consider the same vehicle safety communication rule making for interstate commercial vehicles.

Unlike passenger vehicles, they have the ability to move the rule making on a substantially faster track. And I'll reference the anti-texting ban last April. That took approximately four months start to finish to get that through.
In addition, and it's spelled correctly but the word's wrong, it's supposed to be could be required of all interstate commercial vehicles rather than just new production.

I believe the PAC should strongly advocate for CV rule making for several reasons. One, within a few years, assuming we can get it on the fast track to adoption, many vehicles could be outfitted with devices, albeit aftermarket devices, software communication ability, to provide NHTSA and the auto industry with performance, robustness, security, and viability data to support any passenger vehicle recommendation. Secondly, the in-vehicle real estate for drive device placement and antenna shape and placement are not roadblocks. They're going to carry. You can put it in a lot of places inside the cab.

The additional cost to include vehicles diagnostics, driver behavior monitoring, trailer integrity, road conditions, weather and traffic awareness, is now a simpler business decision.

My partner and I have a small company. We have two Class A Volvos. It will require to do this, we're going to go to the incremental cost to get a lot more information, a lot more utility out of that requirement.

You could also get suitable quid pro quo arrangements with the commercial vehicle operators. And it's then possible for the U.S. DOT, the state, and the local agencies to now put up a relatively small number of receiver stations and transfer stations.

In Detroit, you could put it near the Toledo border at the international crossing, and one on the way to Indiana. It'll harvest tens of thousands of pieces of data on road conditions, weather conditions, traffic, and even extrapolate more information from that data that you harvest from them.

So it essentially solves one of the major roadblocks for the business model problems for
DOTs in terms of harvesting mobility information.

One of the things that I haven't put on here, as a result of yesterday, it would also bring into use the DSRC spectrum possibly years ahead of when it might occur for passenger vehicles, giving us usage on that spectrum of real estate well in advance of when a mass deployment from the OEMs would come out.

The public awareness technology with climate and value proposition and the ability to address security issues are now accelerated in a controlled environment of long-haul truckers.

Our board discussed this at our last meeting. And we view that, if this rulemaking goes forward, that would be a watershed event for the entire ecosystem.

It would proliferate a lot of different kinds of devices, those will be sorted out by the normal market forces. You'll have a lot of ability to extract information. You'll be able to see what the reliability and robustness issues are in a real world environment.

CHAIR DENARO: Now the current schedule says that, as required, decision to consider rulemaking in '13 and heavy vehicle in '14.

MR. MCCORMICK: Correct.

CHAIR DENARO: Are you saying stay on that schedule, but in the '14 --

MR. MCCORMICK: I'm saying that my recommendation is to advocate for both of them for the '13 --

CHAIR DENARO: Right.

MR. MCCORMICK: -- and to very strongly encourage them to consider to move forward with this. Because this can move much, much faster.

CHAIR DENARO: But you're not saying change the date in '14?
MR. MCCORMICK: No. I'm not trying to disrupt what they're process and their stake
is.

(Simultaneous speaking.)

MR. MCCORMICK: I'm just saying we should wait and that this is my reasoning to say
why we should wait and be an advocate for that decision, that rulemaking process, to go forward.

Because I believe they'll have enough information come 2014. Because when they make
a decision, it's not for every vehicle.

It's only going to replace five percent commercial vehicles in a given year, at most. And
they last 30, 40 years. An average long-haul truck's got a million and a half miles on it.

MR. BERG: But a million and a half miles in five years.

MR. MCCORMICK: Right.

MR. LEONARD: So you're suggesting that an actual rulemaking could take place for
trucks even though the decision for light vehicles happens before the decision for heavy vehicles.

As long as they're not a rulemaking decision, you're saying that the truck could actually go
get ahead of that with an early --

MR. MCCORMICK: I believe it would get ahead of that. Because the FMCSA, it can
impact not all commercial vehicles, but interstate commercial vehicles.

They can make a ruling for it just like they did with texting. They can do the rulemaking
without an exceptionally long vetting process.

I don't want them to change their process. I just want the committee to realize that there's
an awful lot of vetting both for the mobility side and to harvest a lot of useful information for
making a deployment decision for passenger vehicles.
There's a number of things that our whole industry fails to do. It fails to do a very good job of articulating a value proposition.

And it's largely because we are business to business. We're not business to consumer, market to consumer. We sell to the dealers. And the same thing with Adelphis and the DENSOS and everybody else.

But when we get down to the issue of saying well, okay, how do I explain the value of this going forward, we tend to talk in very macro levels, are we going to save lives?

Well, we're going to do this, we're going to have that information. We're going to be able to share useful information. People don't get it until they see it.

And they put a lot of miles, and Roger's point, they'll put 300,000 miles on their vehicle in a year. They drive primarily on the major expressways.

Imagine if you're the City of Chicago and you're capturing all of the traffic that's coming off of the I-94/I-80 Expressway going into Wisconsin, or across the Northwest Passage.

There's very minimal infrastructure that's required. And you can harvest a lot of information.

MR. LEONARD: I think you have to be clear about which entity you're wanting to do the rulemaking. Because NHTSA does a different kind of rulemaking with regard to heavy vehicles than the Federal Motor Carrier Safety Administration.

They have different authorities. And both can do rulemakings, but they would not cover the same things.

MR. MCCORMICK: And part of the reason that I am a little fuzzy on that was because last week when I was here for the JTI conference NHTSA people were there.
And I talked to them about this to specifically ask them who's going to make the
rulemaking. And NHTSA said we will be involved and probably will make that rulemaking also.

But I think that's really where we need to get guidance back from your office that says
here's who you want to tell that you want this decision to go forward.

My issue was finding out if there was push back in terms of making that advocacy from
this group.

CHAIR DENARO: Yes. I'm pretty clear about what you're saying. This is what was
behind my question yesterday when I said why did you go with passenger cars first.

My experience is you could make progress potentially a lot faster for the heavy vehicles.

And I do like your idea that because it's basically aftermarket devices that are used, you
really get that part of the market really fast too, which is going to help the passenger car market
because we're going to get penetration, we've all said aftermarket devices will be helpful.

MR. MCCORMICK: We'll also find out what apps are popular. We'll find out which
ones are useful.

MR. STEENMAN: Why wouldn't we be more aggressive about our position?

MR. MCCORMICK: Well, I'm providing a baseline. I don't know where the committee
wants to go as a whole.

CHAIR DENARO: So was your thought on putting this up that this would be one of our
recommendations in your end of your memo. Or are you suggesting yet another memo or
something?

MR. MCCORMICK: No. I think this should be part of our memo. We're not going to
change the 2014 date. And it can also be delayed for reasons of the Secretary as well.
CHAIR DENARO: I would recommend going that direction as opposed to something new. Because we have an established channel for that formal memo.

MR. MCCORMICK: Right.

CHAIR DENARO: And it goes to some pretty cool places, like your Secretary, and Congress, and so forth. So I think I'd like to use that channel to make this message, whatever you jointly decide you wish to do.

MR. MCCORMICK: Yes. My view is that we've never had a good handle on how to justify how the DOTs would gain value out of V2I. And it's been very difficult for them to come up with a value proposition that says, well okay, here's what I've got to pay, here's what I'm going to get.

And so we also have issues in terms of are we using the spectrum, are we protecting it by being users of it. We also have issues of we really don't know, there's tons of different pieces of profit.

I can't tell you how many conferences I've been to, or somebody walked up and said I put a cell chip on an ODV down the line and got end-to-end telematic system. And I'm like why don't you go stand in that line over here called I don't get it.

CHAIR DENARO: So one nuance, a very important distinction here, is you're saying there's a 2013 consideration about V2V for the 2014 heavy vehicle. Let's make that V2X.

MR. BERG: And not only that, you reach the road to deployment, initial deployment, sooner. Because you don't have to go through all the public --

MR. MCCORMICK: Right.

MR. BERG: Is that right, Scott?
MR. MCCORMICK: And it gives us a platform to test a whole variety of security issues for the things that are not DSRC.

CHAIR DENARO: But it's very important what you just said.

MR. MCCORMICK: Any content brought into a vehicle, any private information that's on the vehicle, there's all sorts of possible solutions that can be experimented with by vendors.

MR. BERG: Scrutiny under privacy or fleets?

MR. CAPP: Are we focused on DSRC?

MR. MCCORMICK: I'm sorry, I missed that.

MR. CAPP: You said not DSRC?

MR. MCCORMICK: I'm saying that there's a number of solutions out there. If somebody says you've got to have this box in there, Kapsch makes a box that's got wi-fi, and DSRC, and cellular. They just don't market it.

So there might be a trucker that wants to have Internet content brought in so that when he parks he can go do his logistics or something.

So there might be binary communications that we can look at in terms of content and data.

But it doesn't matter. My point is that I want to push forward to say let's advocate for a strong V2X rulemaking decision in 2014.

Let's not be silent on the issue if we can see that there's multiple levels of value. And I'm trying to say that there are values here for the trucking community. There's values for the infrastructure side, there's value for the DOT.

There's value for all the other participants in the value chain that want to look at security, that want to look at communication, that want to look at the ability for this product, this device, this
system, to provide useful information to reduce accidents, et cetera, et cetera.

CHAIR DENARO: So just let me be clear. I'm not sure I understand this. We're saying stay with your schedule, 2013 passenger, 2014 trucks and all, but change your decision in '14 from V2V to V2X.

MR. MCCORMICK: Expand.

CHAIR DENARO: I'm sorry?

MR. MCCORMICK: Expand.

CHAIR DENARO: Okay.

MR. MCCORMICK: I don't like using the words change with the Government.

CHAIR DENARO: No, no, okay. So the real heavy weight of this recommendation is expand that recommendation in '14 be V2X, not just V2V.

MR. MCCORMICK: Right. The process itself will go faster by itself. I don't mean to confuse it. We're not accelerating the process.

MR. STEENMAN: Is the other part of it, that we are going to add then, to decide on rulemaking versus deciding on whether they want to go do rulemaking?

Because I always felt that the commercial, the consumer vehicle on this year was about a decision to make a decision.

MR. MCCORMICK: That's what it is. It's a decision to make a decision. But the vetting process for interstate commercial vehicles is substantially less than it is for you guys.

CHAIR DENARO: Yes. So are you further suggesting and are you suggesting, Ton, that the 2014 should not be a decision to decide. It should actually be a notice of proposed rulemaking?
MR. MCCORMICK: We can't change that. That is the process they need to go through.

And the process is just that.

I don't want to change their process. I just want to weigh in that I see this tremendous value of expanding the scope a little bit.

MR. FEHR: I was just going to remind you that they want to see an example of that commercial vehicle type of installation. There's one installed on Interstate 70 in Indiana, Illinois, and Ohio. It's operating at 6 points out there. Several fleets of vehicles are involved in it.

MR. MCCORMICK: When you get into commercial vehicles space, there's a whole number of issues. Where is there available parking if you're a long-haul trucker?

And that's why you see them parked on exit ramps. The states have struggled with figuring out, well, how do I harvest that information. They talk to the parking partners and the others. Let's harvest the information for them.

MR. BERG: So your idea is don't forget about commercial vehicles, don't change any of your plan, don't forget about the 2014. That will reach us to deployment sooner than later.

MR. MCCORMICK: And expand it to V2X, not just --

CHAIR DENARO: And expand it.

MR. MCCORMICK: If they come back to the rulemaking and say, well, we decided we don't want to make a rule or if they go through rulemaking and say, well no, we don't want to advocate for that, that's the process that they have to go through.

I fundamentally believe that they will come to that conclusion. And the fact that they can bring it on quicker I see as the ability to substantially explode the environment.

CHAIR DENARO: What's interesting about your proposal, this is also an experiment on
what will happen in the commercial side, the private sector side of this.

If you make V2X be part of it, now you've got developments being done, and services being invented, and so forth. So it's like a little experiment that could be useful for the passenger car decision, which is going to take a long pause.

MR. MCCORMICK: I see it as an accelerant. It may not change how long it takes you guys to actually vet the process for faster vehicles.

MR. BERG: These vehicles?

MR. MCCORMICK: No, I mean all of you guys that are working on it. It may not change that process at all. But if nothing else, you'll be using the spectrum, you'll gain experiential knowledge on it, and it'll be real-world. There's no down side to that.

CHAIR DENARO: Anybody disagree with this?

MR. WEBB: I just wanted it clarified.

CHAIR DENARO: Yes.

MR. WEBB: The idea that the 2014 decision, unlike the 2013 decision, would be to recommend going to rulemaking in 2014, not to decide to go to rulemaking as the next step for the commercial vehicles.

MR. MCCORMICK: No. I don't think we can violate their process. Their process is to first decide whether --

MR. LEONARD: No, no. Let me just weigh in on behalf of Dan Smith, who spoke yesterday. I have heard him say this so many times I feel comfortable repeating it.

He is not saying what the decision will be in '13 or '14. He is saying there are a range of possibilities from this connected vehicle's a terrible idea, we should stop, to here's our finished rule,
it's ready for implementation.

He's said don't expect the extremes. But it's more likely that there's a range of possibilities that are future research questions.

They could put out an ANPRM, an Advanced Notice of Proposed rulemaking. Or they could put out a Notice of Proposed rulemaking, which means they have fewer questions.

So that's, I think, the decision space that I think he alluded to, that they were in that range. And so I would expect a mix.

MR. WEBB: And Scott was suggesting, I think, the committee support the latter, to move into rulemaking --

MR. CAPP: Which alternative they pick really just depends on the maturity of all the data and things like that. Because their preference too would be the right way to go, and collect $200, and start deploying.

But if the data's not there, then you have to step back to something prior to that and ask questions.

MR. MCCORMICK: Yes. That's what I'm saying. I'm not recommending we modify change. It may not say anything other than we think there's tremendous opportunity to include V2X. And we would strongly urge you to proceed with rulemaking, to the decision to pursue rulemaking.

CHAIR DENARO: Because as Ken said, one option is to go to the end of that spectrum where it could be actual rulemaking. We could study it to be as aggressive as the data allowed or whatever.

MR. MCCORMICK: The data could decide that it's not a good idea, especially a year
MR. STEENMAN: At the accelerated that it wanted.

MR. CAPP: I think with the 28 or 30 people Dan talked about and the energy they're getting behind it, I think they're putting as much energy as they possibly can into a rulemaking process.

CHAIR DENARO: The V2X twist is a interesting change to that. And something that we're, why don't you think about this. Let's do it. I like it.

MR. KENNER: Well, the other perspective, when you were describing the proposal, we were doing the model deployment in Ann Arbor. And in Ann Arbor we're getting experience with the technology. But we're also getting some vehicle data, right.

MR. MCCORMICK: Right.

MR. KENNER: In this case, the rationale in terms of accelerating would not be that we'd get more vehicle to vehicle data to be able to understand the cost benefit analysis associated with the reduction in accidents, injuries, or fatalities, but in fact experience with the technology itself.

And so it's like a safety model deployment, but really from the technology. So you've got a controlled environment where you're able to then exercise the technology some more to figure out how does the security management system work.

MR. MCCORMICK: And you can to do V2V is you wish. I'm not saying --

MR. KENNER: And you should. But you couldn't use that data to then extrapolate the passenger cars. But the value isn't that. The value is in having the technology, the hardware and software all out there.

And to make it valuable we would want to try, I think, to try and model, including the
safety credentials and all those kinds of things in order to be able to maximize the value of it.

Because if you can work out the bugs in whatever we come up with in advance of rolling it out to passenger cars, where truly the safety benefit resides, I think there is benefit in --

MR. MCCORMICK: And the truckers are more fault-tolerant of those kinds of systems. And I had one of those Cisco satellite things in both my trucks. And it doesn't work sometimes.

And it doesn't really matter, because it's not critical for my safety. Because it's positioning, and hours of use, and logging, and stuff like that. So it is a more fault-tolerant environment.

MR. LEONARD: So, Scott, you keep coming back to trucks, the heavy vehicles, trucks and bus, decisions. And you were arguing that this is an environment where it maybe more conducive in getting --

MR. MCCORMICK: Well, it's interstate commercial vehicles. That may not be a semi.

MR. LEONARD: -- okay, right, okay, in getting to a rulemaking decision earlier. And I don't disagree with that.

But you're also throwing in V2X, which in my mind says motorcycles, pedestrians, bicyclists. And none of that work is being done in the safety pilot. So I'm not sure that -

MR. MCCORMICK: Well, I'll tell you what's being done. It's being done on the handset side. Because the handset side is looking at if I'm riding my bicycle, or my scooter, or my motorcycle, I have this little device with me.

And if I can broadcast a signal that you can receive and know that I'm there, the more the better. If your truck doesn't have it, my --

CHAIR DENARO: But you won't know enough about that in 2014. I can tell you that
right now.

MR. MCCORMICK: No.

CHAIR DENARO: The V2X spectrum is very, very wide. We don't necessarily have to go, I don't think, to bicyclists and others. We can do a narrower V2X, which are some of the data mining --

MR. MCCORMICK: I try to make it very simple, road condition, traffic condition, weather conditions. You harvest that information --

DR. KLEIN: Ken's point is a good one, which is you're making two recommendations and keep them separate, just for clarity, is my understanding.

Fine, go with motor carriers, Recommendation Number 1, and expand the scope to include V2X. And those are two separate recommendations.

And either one would be, I think, valid and interesting, even if you left out the V2X. I think going to motor carriers as an early bet is a good strategy.

MR. MCCORMICK: Well, that's having to be done in '14 anyway.

DR. KLEIN: After 2013, accelerating it, or recognizing it for what it is at minimum.

MR. CAPP: Don't forget about it. Just because it's 2013 for light vehicles, don't forget about what you've got going on a year later, which will be here instantly.

MR. MCCORMICK: Right. My view is that I'm 60. I don't want to wait ten years to use this, right. I would like to see something going on that helps move this forward.

Because I see a lot of commercial advantage for people being able to test out new devices, new products. You guys can figure out, okay, there's a better tip set that you can do more processing on. They could capture video with it.
The extensibility of the platform is tremendous. If I'm just creating a developmental environment, if you will, creating a developmental environment for industry, I'm creating utility for long haul truckers.

I'd like to know what the weather is. I'd like to know what the traffic is. And I'm providing an opportunity for the infrastructure, for the DOTs to harvest and utilize more useful information that they can capture --

MR. CAPP: Even if it's only on major arterials that truckers go on.

MR. MCCORMICK: Even if it's only expressways, right.

CHAIR DENARO: All right. So it sounds like we're violent agreement. So, Scott, if this means that you're going to volunteer to write up this particular recommendation, thank you very much.

MR. MCCORMICK: Yes.

CHAIR DENARO: And please do so. And we'll get that in our list and move on.

MALE PARTICIPANT: Good idea, Scott.

SUCOMMITTEE REPORT OUTS AND DISCUSSION

Security Subcommittee Report Out

MR. MCCORMICK: I'll just go to the security one. I'm not going to go through the entire workings on this presentation. Because this is what we did with the security. I'm just trying to hit the three main things that you'd asked for.

A couple of informational things that people may not know. The auto industry and the federal government has spent several years and millions designing and protecting DSRC communication lines.
There's a major program now with NHTSA and the U.S. DOT Volpe center to address
cybersecurity of automotive safety critical electronic control systems. It's called CYBER.

That program basically addresses these elements. It's looking at protecting the engine
control, the automatic stop/start, the forward crash mitigation, all of those systems that need to be
protected from any sort of corruption or influence.

And my statement there is that I think that's being worked on right now. And I think the
stuff we've worked on, on the communication link, has been worked on right now. And this is
more detail on that program. I'm not going to go to it.

UC San Diego, maybe if you know this, it's sort of malware on a CD. This was put into a
car with a cell connection and it infected the car.

The data detected other cars in that cell phone directory. The researchers were then able
to control the infected vehicle's functions via cell phone remotely. Also, and I had this in
there to put there, but they've discovered that they can wirelessly also access the vehicle through the
tire pressure gauge, which communicates wirelessly to an ECU in the car and be able to get into the
network and into the catalyst.

When you look at what's going on out there, McAfee's has identified eight million new
pieces of malware just in 2012. Trend Micro's got 145,000 just in malicious apps in September of
2012.

With the advent of third party apps and downloadable content, the fundamental concern
now is to protect the vehicle's data apps and content from corruption.

The 2014 Impala has a valet mode on it that you leave a four digit pin and it locks out the
infotainment system from hitting the kind of problem that we saw in the first one. I believe CUE
has it now in this year's model they deployed.

The communication between the car and the outside world, for DSRC that's probably secure. I don't know that there's much more that can be figured out in an app. You can't secure all the vehicles operational signals. The OEM set their programs they've been working on forever, and will continue to work on, and it's a CYBER program.

Infotainment, that looks at now CURIO, the music video voice that will be the repository, most likely, of apps, and personal data, and content.

We have seven auto makers that are all working on tethering phones to utilize either the display screen, the speakers, or the microphone as peripheral devices.

I believe that there's a huge risk and there's really no clear single solution. Let me just skip that. In the interest of time, because I know we've got all these other committees, I'm not going to go through the detailed risks. I'll go to the end.

To maximize the potential of the U.S. DOT CV program and achieve an optimal ITS ecosystem that supports safety, mobility, increased transportation efficiency, and environmental applications, we must have a clear and implemental ITS privacy and security strategy, not a policy.

We don't have policies for privacy in the United States or for data ownership. We have guidelines for them.

And we must have something that harnesses both the connected and the autonomous technologies. Because they're completely complementary in this space.

The ITS strategy must include the technical and policy solutions, mainly a fully secured connected vehicle network and app for consumer privacy protections that evoke trust from drivers and passengers traveling on the roads and highways.
And I hope, Mr. Leonard, during our security briefing here, is that I think the one thing that can happen that will help this is for a privacy guideline.

There are 24 privacy guidelines in the United States. They deal with things like HIPAA, with the health and insurance information, they deal with the financial transactions, they deal with credit cards, and they deal with industry self-regulated guidelines in terms of how you should behave. We will never get, because the U.S. Government has never ever voted on or approved those, a privacy policy or a privacy regulation.

But if we have a guideline, and those guidelines from those 24 covers basically everything that the car's going to do.

If you look at the HIPAA guideline, or you look at the financial transaction guidelines, those guidelines say the industry practices should be this. These are what the right things are.

And what I had asked them to do is I said I think what we need here, part of the strategy is to work towards what that policy should be at a high level.

And if we can get them to put out a guideline, and it doesn't matter who the industry is that it's self-regulating.

If it's the communication industry, because they're working over their wire ways and communication protocols, if it's the OEMS, if it's the suppliers, if it's the aftermarket, those guidelines are fairly straight forward and simple.

They're not mandatory. None of them are in the United States. But that, I think, is the only thing that will be useful in the security space.

And the one thing that I've recommended is that I don't think we need federal government involvement on those security issues for the apps and content.
But what they can do is to provide the ability to make other industries aware, through their V2X meetings that they have once a year or through other forums -- possibly through ITS America and possibly through their own meetings -- to bring together all of the stakeholders in the environment that can contribute to that. Because the biggest issue, of course, is knowing who to talk to to solve the problem.

DR. KLEIN: Maybe it's getting a little late in the day. I'm getting a little punchy. But something just occurred to me. We're looking, NHTSA, privacy regulations, it's going to save the ITS premise, move it forward significantly.

When you look at the security stuff, which we're reading about and, yes, there's some security issues. What if somebody does a headline, ITS: Unsafe at Any Speed.

These security gaps, when we're not reading about them but actually experiencing them, are terrifying. And I have to say personally, as a somewhat informed networking computer person, my trust in my PC has steadily declined over time.

It has not gone up. I consider my systems less secure as they advance. Throw that out there. Are we taking the security seriously enough that it is potentially explosive?

MR. MCCORMICK: Well, you can think of it this way. For example, if Toyota puts out a system that is some way easy to violate, they will be the ones fixing it immediately because it affects their brand.

Is there anything common about how one manufacturer versus another manufacturer may do it? We don't know because it's below the dash. And as a consumer you don't care. You just want it to work, right?

So there isn't any real point in trying to structure commonality if that's not something they
want to work on on a pre-competitive basis.

So the issue is really one of putting together a guideline that says if I have a guideline for this -- how many people don't trust that your health information is secure?

You know there's a guideline. You know it's at held at the hospital or whoever is going to adhere to it. Because they say right down there that we adhere to it.

Part of the issue about consumer confidence is whether or not you've created a mechanism. Nobody expects you to be perfect. No solution we create will ever be a perfect solution, or that anybody ever creates will be a perfect solution.

There are lots of smart people trying to find lots of ways to get it. And if we try to say we're going to create an ironclad system, or expect the industry to create an ironclad system as a common framework, it's not going to work. It won't happen.

So the issue is one of where can the JPO add value and how can we do two things that we need to do, create a set of privacy guidelines that we allow the industry to use. I'm not on the right chart here, there's the last line.

Industry is in the best position to develop technological standards and solutions to address the security challenges for the ITS infosystems.

They should be encouraged to even encourage it, possibly bring in other stakeholders into the forum for discussion. And they should create this privacy guideline. Having the 25th one is going to be an extremely simple thing to craft. Because the framework is already there.

And you provide that out as a recommended practice for industry that you self-manage.

That's how all of our privacy guidelines work. And one more in this space will put a stake in the ground that says we recognize that personal data and privacy is an issue.
We are never going to be able to protect somebody from getting the wrong information.

Let me go back here. The issue isn't, from the last line, how do we keep the data from bad people. It's how do we keep people from doing bad things with data.

You do that through the penalty. If I take your credit card data and do something with it, there's a penalty for that if I'm caught.

And we're never ever going to be able to prevent people from getting to the information if they really want it, or watching one on your door. But somebody can also go get a bigger hammer if they want to get in.

You want to make it difficult for them. And that's what they do. That's part of what they do to make their systems robust. But the real question is that the recommendation is to create guidelines for privacy, take it off the table.

There's four pieces of legislation right now in Congress on privacy. And they're all written by legislators, litigators, and consumer privacy advocates, people that don't understand anything about the data.

And when you look at the data itself, there's too many open questions. What data? The exabyte of data generated by a car in a year.

Why buy a TV with a remote control. I may not want the government, or the TV manufacturer, or my wife to know what channels I'm watching. But that doesn't give me rights to the data streaming out of this signal running through that device.

That's pretty much IPs. It's the knowledge, the metadata if you will, about what my action caused that gave me something to do.

So the question is who owns it. And what about the metadata? How will you handle
dual ownership? Anything that gets transmitted over any communication protocol has be
definition and by law two owners of that data.
CHAIR DENARO: Scott, I'm losing track a little bit. If you could help me. Can you
show me the list of issues that you're proposing? Is this background that --
MR. MCCORMICK: I don't know that we need to go into that. I think the fundamental
thing that I wanted to say is that one of our recommendations should be for the JPO to put out a
privacy policy --
CHAIR DENARO: Yes, okay.
MR. MCCORMICK: -- that we'd have to construct. And it takes the rest of the issue off
the table and leaves it in the hands of the OEMs, the tiers, the processing, the communication
people, that are the ones that are going to handle it eventually.
CHAIR DENARO: Okay. Do you have more issues too, or is that the only one?
MR. MCCORMICK: I have lots of issues, but I'll just sit down.
MR. STEENMAN: Well, we have the security thing, right?
CHAIR DENARO: Right.
MR. STEENMAN: But we have two. There's privacy and there's security.
CHAIR DENARO: Yes, okay.
MR. STEENMAN: And they are two entirely different things.
CHAIR DENARO: Yes, fine. That's what I'm asking.
MR. LEONARD: I understood Hans' question to be not the privacy security issue, but
more of a safety security issue. Not, gee, I'm afraid of somebody getting my data, but I'm afraid of
somebody keeping my car from stopping at the intersection when the light turns green.
(Simultaneous speaking.)

DR. KLEIN: Just somehow getting the penetration that those are, they're words on the tape, which what I heard about that were a layer of it, and just sort of sinking in how significant that is.

If there is a regulatory ruling and procedure, maybe one of the outcomes would be a deeper realization that there's a regulatory problem.

MR. CAPP: Dan mentioned yesterday, to go two directions, they will need to address as part of this process what is the overriding security framework.

And through the program there's been pieces contracted out quite a bit over the last couple of years in this area. What could a security management system look like? And there's a few different models. And that's what Dan was referring to, that there would be drafts for the rulemaking, who actually executes it is under question.

CHAIR DENARO: But do we have recommendations in this area? We know there's a lot of work being done on security. And Roger has been the party to some of that, so he can help us and so forth, either aspects that we feel we need to weigh in with respect to safety, security issues, to recommend additional work, or different work, or whatever.

MR. STEENMAN: Yes, absolutely. We wrote that stuff down.

MR. MCCORMICK: Yes. And the primary one is the certificate authority. The certificate authority is one mechanism of handling it. And the Europeans are going, well, we're going to provision a whole bunch of certificates in the vehicles the day we sell it.

MR. CAPP: Right. So everybody's heading down a certain pathway.

CHAIR DENARO: We're all going down the path.
MR. CAPP: I'm confused. Is our recommendation to the program that the path that they're working on with certificate authority is too much, too little, the wrong direction? I'm confused as to whether they should --

MR. MCCORMICK: I think they need to put more study into it. Because the safety pilot isn't testing the security aspect of whether or not a certificate authority works at all.

We only have anecdotal evidence about it. It might be the best solution. But my feeling is that --

MR. CAPP: Part of it is being modeled in the model deployment, how deep it's getting into simulating the --

CHAIR DENARO: Well, in our technology subcommittee, we talked about this. But we deferred to you guys because we thought it was more on your plate.

But let me tell you what we talked about in our subcommittee. And that was, with respect to the good system, we're going to accept that probably the work that's going on is pretty good and so forth.

One gap we seem to have here is we don't understand how you're going to manage quickly detecting a bad actor, getting in the distribution problem -- and tell me if this isn't right -- but the distribution problem of getting messages out to that vehicle saying you're a bad guy and to everybody else saying he's a bad guy.

And what is that delay and what are the consequences of whatever that delay is. So there was a specific piece of it we weren't sure has been studied enough. And that, we were thinking, becomes a recommendation.

MR. STEENMAN: Yes, absolutely. And I think we came to the same conclusion, same
thing.

CHAIR DENARO: Yes.

MR. STEENMAN: We came to the same conclusion. And there's some good work that's been done, and hardware, but it is not comprehensive enough to say that this will be work.

MR. MCCORMICK: And we just expand it to say, well, there are other mechanisms of doing it aside from a certificate authority, not that I'm saying it's not a great solution.

MR. BERG: Yes. Don't open that can of worms, please.

(Simultaneous speaking.)

MR. MCCORMICK: All right, I won't.

(Laughter.)

MR. STEENMAN: The other discussion we had, we said there is the DSRC security basically we're provided, particularly if it gets regulated. Also the security part of it needs to be robust.

Then there's all of the other gateways into the vehicle. My position is the current OEMs have a huge incentive to take care of that right. It's your brain trust.

MR. CAPP: There's a ton of work going on with regard to security of embedded electronic systems.

MR. STEENMAN: Right.

MR. CAPP: It seems like that's beyond the scope of what we're --

(Simultaneous speaking)

MR. CAPP: -- what's going on. I'm sure everybody else does to, government agencies as well. There's a lot going on.
MR. MCCORMICK: And that's really why I wanted to just say I think the only real role anybody has in that is to create a privacy guideline.

CHAIR DENARO: So, Ton, what is your point then, you were --

MR. STEENMAN: Oh, I don't think that we necessarily should propose a lot of additional things that need to happen outside of the DSRC space, vehicle to vehicle. Because if that gets legislated and enforced, we need to put a security wrapper around it, otherwise NHTSA can have it enforced. And they can't enforce it without the security being solved.

MR. BERG: Right.

CHAIR DENARO: Okay. We did discuss something else in our subcommittee also, which we thought would impart to you.

And that is, while we understand there's a ton of really good work going into solving the cybersecurity problem and it's going to result in some really, really effective stuff, at the end of the day -- and this was part of what you sent me, Ton -- you're not going to stop at all.

It is quite possible, and maybe inevitable, that there will be a compromise at some point. And I think that the example used is banks, medical facilities, corporations, governments, all have pretty damn good cybersecurity in place. And they've all be compromised even very recently.

So the point is, fine, great work on all that. But you haven't told us what your process is when an event would happen. What happens then? How do you handle that? How do you manage that, within the system, within the vehicle, within the infrastructure, and so forth.

So let's go to that tail of the distribution and say, okay, it's happened. How does the system handle, detect, respond, what is the process? And that was a recommendation, define that
MR. MCCORMICK: I don't know that's any different than how fault-tolerant the system is.

CHAIR DENARO: Well, maybe there's a recommendation that systems have to go into a known good state. You guys do this all the time, for your safety applications in vehicles.

FEMALE PARTICIPANT: Oh, okay.

MALE PARTICIPANT: Like a restore.

FEMALE PARTICIPANT: I see.

CHAIR DENARO: Years ago I was involved in GPS security issues. And we came up with a concept called RAIV, receiver autonomous integrity value.

And the whole issue was how the heck do you detect that you even have a problem. And then so the biggest problem is how do you detect.

And then the second problem is once you detect what do you do about it. And so that constitutes a recommendation. It's not our job to get into saying, oh, here's what you ought to do.

We're not coming up with solutions. We're just identifying here's an area which maybe you haven't...
looked at enough yet.

MR. CAPP: The controls piece that will be addressed through --

CHAIR DENARO: Correct.

MR. CAPP: -- other types, but in terms of just the message sets themselves, when it's compromised, where does it go?

CHAIR DENARO: What does the system do.

MR. CAPP: That's a good open question about it.

CHAIR DENARO: Okay. So can you guys flesh these out going forward now?

MR. MCCORMICK: Assuming he wrote it all down. My memory is failing.

CHAIR DENARO: Well, we've got rational discussion in ours too. We can always share that.

But if you guys would just get to a limited number of recommendations, however many it is, I think I just heard maybe three, maybe there's more. And just do this background, and recommendation level, and be able to share that going forward.

MR. MCCORMICK: I'm going to bounce the last one off you guys to make sure you get the wording correct.

MR. CAPP: Sure.

CHAIR DENARO: Yes, yes.

MR. MCCORMICK: I mean before we bring it to the --

CHAIR DENARO: The process here, by the way, is we're looking to the subcommittee to do all the heavy lifting, get this stuff into text and where you think it's ready to go. And the committee will look at that, wordsmith, whatever. And we may have one or two to respond to.
MR. MCCORMICK: Right.

CHAIR DENARO: Okay, great. Who's our next up? You're still working, right?

(Off the record comments)

DR. KLEIN: I'm going to have even wordier slides than Scott does, just you wait.

Technology Subcommittee Report Out

CHAIR DENARO: This is what we did in the technology subcommittee. We came up with 11 candidates. Candidates were vehicle positioning, robust and affordable, two different things.

Number 1 was driver interface and standards. And another one was driver acceptance. Fourth one was DSRC robustness and scaling.

I'm going to get into the real world. Another one along the category of open architecture, bad tag distributions. It talked about that. So that's the one that talks about you guys.

Another one, a process for hacking. That's the one we just talked about just now. It's going to be compromised at some point. And what happens at that point? So those two we're throwing back at you guys.

Service security, what about looking at other industries? Could this be a recommendation, the packing industry, the medical industry, there are probably more, the credit card industry, which has solved it. Are you doing enough to review them?

The little dashes here means we threw it off the list. We tried to go over the most important ones. If you guys disagree, we can bring these back.

Number 8 was cybersecurity, hacking, is there a solution, I think. That sounded similar to this one.
MALE PARTICIPANT: I think you included that one.

CHAIR DENARO: Smartphone for DSRC aftermarket, the fact that smartphones could be an aftermarket device for a lot of this. We also spin off this, because there is a lot of work going on in that right now.

(Simultaneous speaking)

CHAIR DENARO: Data sharing, which is what you were saying to the trucking guys. And the last one was spectrum sharing.

So coming back, we decided the significant ones were these four here, I guess. Spectrum sharing, we're already handling with a separate little committee and some effort.

We'll bring this in also as a recommendation in our memo. But we are handling that separately. So we really focused on a fewer number of items.

MR. MCCORMICK: Can you explain the bad tag distribution one at a time now.

CHAIR DENARO: And that's the one where we just talked about where you got a bad player and what is the latency of detection of that.

And you've got revoking the certificate, getting more inside the vehicles and so forth there.

So first one that I'll go over here in more detail is this robust and affordable vehicle positioning. And the background on this, so background and recommendation, background is accurate, as opposed to precise.

So accurate reference to the road is important. We think about this as being vehicle to vehicle. But it's also the road, because miscellany and so on and so forth. So it's not just vehicle to vehicle.

But vehicle positioning is critical to the operational system. For example, putting a car in
the wrong lane could lead to both faults and mis-alarms, stuff we won't have it.

Things we know that can affect GPS, urban canyons, so physics, we see that 50 percent availability. And they've been serving urban canyons that you can expect, tunnels, multipath, rural canyons, not just urban canyons, and sunspots.

And that might sound funny, but sunspot activity does happen, and does hurt GPS, and it's like an 11 year cycle. And although it's very rare when it happens, it can wipe out millions of vehicles.

All of a sudden you have the GPS scrambled. So you could have not just a vehicle hit a median, in fact you've got a huge widespread thing for some period of time, whether it was an hour or whatever it is, what happens there.

Roger told us an interesting anecdote that right before the first driver clinic they had a sunspot smashed on GPS the day before there was a clinic.

And the GPS was all gone haywire. And then I had jamming in here. But I didn't mean intentional jamming. It's electromagnetic interference from any number of sources. And that could happen.

So there's a lot of things that can affect GPS. The differential GPS and the assisted GPS don't solve that problem. They improve accuracy when things are good. They don't handle the bad things anytime satellite isn't available.

And good dead reckoning, even to get to just the accuracy part, can be expensive.

Because cheap gyros and accelerometers get you like ten seconds of good stuff maybe within the land. After that, forget it.

So a recommendation, more thorough analysis of the probability of insufficient accuracy
in the environments in which they occur, which is to say, no, this doesn't happen often.

But what happens when it does? What are we going to do with urban environments?

What percentage of time are vehicles going to be there? What percentage of time are vehicles going to be in tunnels?

And what are the consequences that we expect there? And let's get some handle on what this looks like. Consequences of the failure, that's kind of like a failure mode and effects analysis.

So, yes, it doesn't happen that often. We just said how often it might happen in these environments. And when it does happen, what are the possible consequences on each one of these use cases, for example?

What does this mean about blind spot detection, and intersection collision, and that sort of thing. And what do we think about those answers, those conclusions?

Detection, when they occur, so how do you detect that this factor you see for autonomous integrity monitoring they're talking about, how do you detect that if you guess you've gotten in the wrong lane, or something's going on like that.

And the final one, and this is a little more controversial perhaps, but consider multi-sensor integration beyond the gyro and accelerometer.

We heard yesterday NHTSA say, oh, we're not saying throw out the other sensors on the vehicles. And I don't think we want to recommend that they would do it, that this potential rulemaking include putting other sensors on the vehicle also, going beyond the onboard unit and, say cameras, or LIDAR, or radar, whatever.

But let's say, and this'll be a guideline part of the rulemaking, if it were there, to the OEMs, saying you've got camera systems on there, strong recommendation to integrate the positioning of
the camera so you've got lane detection as well as GPS. You've got a more robust solution. So that was the recommendation to it.

MR. MCCORMICK: The only reason I have a problem with that one is that the rulemakings rarely specify physical hardware. And they require functionality. You have to do this, perform this, do that.

I see a huge problem if he can do it algorithmically and the other guy has to use a piece of hardware, or a lane-departure camera, or something, the reality is did you accomplish what you wanted to do so that last lines is kind of like --

MR. CAPP: Depending on what material, what features, or what information you're ultimately going to give the consumer, yes, you're going to need to fuse as much good information as possible.

CHAIR DENARO: And you're probably going to do that anyway.

MR. CAPP: You're going to want to, yes. It'll vary. It'll vary. From a NHTSA rulemaking standpoint, I don't know. It depends which features they decide are required.

CHAIR DENARO: Right.

MR. CAPP: And they're going to have to base their rulemaking on realistically a pretty limited set of features additionally. Well, it's fair enough. That is in the right direction.

MR. MCCORMICK: I wasn't sure about that. That's why I questioned like that.

CHAIR DENARO: Anyway, we'll go ahead and write this up. Are there any comments? Not yet.

MR. WEBB: Is this focused primarily connected vehicle, vehicle to vehicle?

CHAIR DENARO: Yes.
MR. WEBB: You're not thinking pedestrian, bicycle, all that?

CHAIR DENARO: No. Okay. So that was the first line. Oh, so we're here right at this. After all these, you have to work that up. This is what I said we weren't going to use, but we actually write it up.

So this denial will occur, however infrequent it is, however improbable it is. So what is the policy when it does, background, I already covered this. So we know it's happening.

We've seen before, Ton shared some really cool stuff. The one I got a kick out of was never have thought of was tracking tire pressure monitoring accessories and tracking vehicles off the signals out of that, which is pretty crazy, Bluetooth, whatever, there's any number of ways.

So sure, recommendation, do our best to prevent it, but to know a process when the inevitable happens, detection and response, what we just talked about.

MR. MCCORMICK: I'm not getting how this is a recommendation for the JPO. I understand what is something the OEMs want to do. But what are we recommending to the JPO?

MR. BERG: Well, an acceptable performance standard.

MR. MCCORMICK: Okay, thank you. All right. And because one of the things we looked into was why those medical devices were passing viruses around internally between them, and in those cases basically solved that problem.

Because there was no server side security, if you will, right. Which is the same thing that you had with an ad hoc network of vehicles floating around all over the place.

So I think there's a valid point that there's other industries that have addressed collateral problems that might be worth looking at.
CHAIR DENARO: Well, and we'll have to work on the wording of this. Because John had a good comment that they're going to handle what happens in the car, was it rider systems at all, this bigger system issue about what is the response, and what do you do on that. And so we've got to separate those two.

MR. BERG: The thing about connected vehicles is John depends on what Steve does in his spot.

CHAIR DENARO: Yes?

MR. CAPP: Yes.

MR. BERG: So that's a little informative.

(Simultaneous speaking.)

MR. BERG: So I've already talked about it. One of the issues was how's the bad actor detected. So what is a bad actor, first of all, just a little background.

So a message is transmitted that's different from reality causing an urgent act to the system, to the transportation system. And then if a bad actor is detected, what is the appropriate action to take or how can the effect be minimized?

MR. MCCORMICK: I would just offer it doesn't matter whether it causes an adverse impact to be a bad actor.

MR. BERG: Well, that's what a bad actor is, because --

MR. MCCORMICK: No, a bad actor's just transmitting incorrect information. It doesn't have to cause an adverse impact.

MR. BERG: Well, if it doesn't cause an adverse impact, then I don't care about it.

MR. MCCORMICK: Okay.
MR. BERG: So what, it's going off into the air. It's a little semantics.

MR. MCCORMICK: Well, I've taken a more common approach. One guy sending information that doesn't cause bad information is one thing. But if I've got a swarm of them going down the road communicating bad information, collectively they could create an adverse impact.

MR. BERG: Correct. But in vigilance --

MR. MCCORMICK: One guy could cause an adverse impact, they could say I'm stopping when I'm not.

PROF. RAJKUMAR: The problems could be two, four, could be three years, part malicious.

MR. MCCORMICK: Right.

MR. BERG: So it could be equipment failure identification. That's not necessarily malicious in the vehicle. So ordinarily that's the OEM's responsibility to understand when and where his equipment inside the vehicle is cooperating, or acting as designed.

And the other recommendation is to have a certified proper response. What did that mean? Oh, so for example, through the certification process you could purposely say the GPS is bad, so that the OEM would have to have the right response to that, as in not transmit a piece of data or something like that.

MR. KENNER: Yes. So I agree. If we say there's something wrong and we alert the customer, your vehicle's no longer able to detect other vehicles or your GPS signals are gone, we should do that in the exact same way.

MR. BERG: Right. The real question is, not the question, the real issue might be that you don't send somebody else bad information.

MR. KENNER: Right. Really, with one car? You guys would care, but the system
doesn't care.

MR. BERG: Right. The other situation might be an outside attack. So we don't know how to do this but find some way to ignore in these behavior devices, these behaving devices.

MS. HAMMOND: As a reader, as another reader?

MR. BERG: As a receiver, right. And then there might be a way to do the two recommended action for both, either the equipment failure or the outside attack.

And that would be to create a local distribution of a revocation list based on data from other sensors or from the behavior of the vehicle itself.

So for example, you're hearing a vehicle in front of you. One equipped vehicle is stopping abruptly and the vehicle behind it not stopping. But there's no crash. So that would elicit a localized revocation list response.

MR. MCCORMICK: So one vehicle could revoke in others?

MR. BERG: No. All it does, it doesn't revoke it. It just sends out saying, hey, you're listening to this vehicle. Don't believe him. Because one guy didn't stop when he was supposed to. I'm simplifying it.

MR. MCCORMICK: What's to prevent somebody from creating that signal just to spoof others not to believe in other traffic?

MR. BERG: Then you go to recommendations on acting.

MR. MCCORMICK: Ah, okay, fair enough. See previous page.

PROF. RAJKUMAR: Yes. Bob used the analogy of Facebook likes and dislikes, right. So all of our people basically you say we like it. That's probably true, based on --

MR. MCCORMICK: Yes, I could see if you're using --
(Simultaneous speaking.)

CHAIR DENARO: The data that occasionally get rejected by some other data, okay, if one vehicle all of a sudden has a ton of things coming you can say, wow, this guy's really weird. Maybe there's something to it.

MR. MCCORMICK: Smart network.

MR. BERG: That's it.

**Market Driven Adoption Strategy Subcommittee Report Out**

CHAIR DENARO: So we'll write those up and we'll be able to read them in more detail and understand them, hopefully.

And Hans is going to be the most prepared of all of us, since he's been diligently typing away, fingers to the bone --

DR. KLEIN: No. I just like to treat you to the universal experience of watching me fiddle with a computer. Is this thing hooked up? I'm a little worried about it. This is password protected.

Okay, ITS Implementation, this is our market subcommittee, which may or may not be appropriately named.

We reserve the right to touch on other issues. Because we're looking really at implementation through markets, both in the public and private sectors, if you will.

MR. MCCORMICK: You spelled John's name wrong.

DR. KLEIN: Okay, we've got various names there. They're probably all misspelled, all of these. Just what I thought. This is a subcommittee after all.

MR. MCCORMICK: But phonetically it's correct.
DR. KLEIN: Phonetically it's correct, yes. There we go. Okay, sorry about that. Let me say our committee is in its early stages.

We have started looking at more data images. I think they're emerging perhaps even in the focus. We'll touch on it a couple of times in this committee. We're getting more focus now.

I think the program is also obviously continuously moving towards greater focus on that shift, maybe from technology to more implementation issues.

Our committee may have started out as markets. And we're referring to implementation generally here. There's two areas of implementation.

Let me just say, the rest of these committee guys are getting around to hitting off the bullet points. Our committee got together and it was a little bit, oh, I think this, I think that.

And everybody said their piece. And it's like, wow. There's a lot of stuff on the table here. So we're a little bit coming up to speed. And I think this implementation stuff is very broad and very complex. And it's reflecting it.

So in part, I'll cover some broad areas. And where I'm specific, my fellow committee members will open up to vociferously say we didn't say that. We didn't agree to that. Somebody said that, probably you, but we didn't all say that.

It helps to divide it into two areas in implementation, public and private, at the first. We see that already in the V2V and the V2I dichotomy.

But V2V, going for private implementation, largely market based implementation, with a little bit of regulatory assistance.

And V2I, which even as a concept you get quickly into various things. We're talking about infrastructure, roadside equipment, operating agencies, state and local, et cetera, et cetera.
It's a public implementation.

The term here, we call it implementation, we call it deployment, and so on. And you find different terms for public sector implementation. But there's a common challenge regardless of the sector.

First of all is the autonomy of the implementers. This is the Alice in Wonderland problem of playing, not golf but croquet, with a flamingo, right.

You think your tools are going to, you have this great technology. You pass it off and it's going to go like clockwork. And instead your implementers are like what is this, why am I doing this? There's always a risk they'll not take it.

So there's always a problem about tying to implementers and implementation situations. There's a problem with coordination as we're doing large systems. There's lots of different entities out there.

And even if some of them come along when others don't come along, and we get some of these technologies to work short of having everybody onboard, so there's coordination problems all over the place.

MR. WEBB: Hans?

DR. KLEIN: Yes.

MR. WEBB: Is there any problem in the first one, V2V?

DR. KLEIN: There's a public up here. I'm sure there is in the simplified version. Let's discuss that later. It may get philosophical, it may get --

MR. STEENMAN: I do want like security certificates are a V2I thing.

DR. KLEIN: Right. For sure. Security certificates are V2V --
MR. STEENMAN: But there will be a public part of the V2V --

DR. KLEIN: Well, even there it's my understanding that the strategy is not necessarily a public strategy. It's a private utility almost strategy.

MR. KENNER: Yes. I think it's probably public/private partnership maybe.

DR. KLEIN: It's not decided yet, that much I know.

MR. KENNER: But I think it has to have, per our discussion, a public element too, for sure.

DR. KLEIN: Yes, that it does. It might be a regulated private, or I tend to use the word utility. I don't know if that's how --

MR. KENNER: It'll be a new role for the agency I think, right.

DR. KLEIN: Yes. And I'll touch on that. I'll tell you in a minute. So the key thing about implementation, it's all about institutions.

And maybe Ron, Steve, looking at that sub-set, that's a really crucial thing. It's all about institutions. The focus here is much less on technology and more about the complexity of the environment in which you're trying to insert.

So the institutions in the private sector, a big factor is an independence of multiple independent players, whether they're OEMs, Tier 1, aftermarket. We anticipate them all playing a role in a coordinated fashion of their own free will. Whether they see themselves playing that role is a different issue.

In the public sector, basically in the Federal system, right, what the states and localities do, at the National level you may or may not be able to influence them.

And one state versus another state, one city versus another city, you have thousands of
They are likely to adopt context-relevant solutions, i.e. the focus on the problems they've got and the way they do things. And they're likely to see a lack of consistency as they adapt technology to their own needs. That can be seen as a very positive thing. Different people have different problems. They solve their different problems. But it can lead to one scene of a National scale market consistency and slow the rate of adoption, including slowing it to zero in cases.

These institutional barriers are recognized. One of the reasons, as I understand, why V2V has gone ahead as rapidly as it has is that it's actually a less complex institutional environment to implement technologies, arguably you're avoiding these thousands of jurisdictions. And it's not easy to implement V2V, but in some ways it's less complex than it is in the public sector, ironically.

So let me talk a little bit about private sector implementation and then about public sector issues that we as a committee talked about.

The private sector implementation problem, I'll tell you the biggest thing is this coordination problem. How to achieve simultaneous use by lots of autonomous players. If you're going have to the safety benefits, you need that high market penetration. So the simplest case we've got a big problem getting lots of independent people in a coordinated fashion, boom, to implement the technology.

This idea of NHTSA as the coordinator, the solution to the coordination problems in the private sector is that the Government plays a role of getting everybody to make a collective decision
all at the same time, mandate simultaneous adoption of by all parties using the safety authority to
solve the coordination problem.

This, for me, is important and exciting. We talked about it. V2V is more than safety, but
it's being pushed forward. And that general coordination problem is being solved on a justification
as one particular use, safety use, safety benefits.

The V2V is potentially a general purpose broadband infrastructure. The term was used,
it's an enabler for a lot of stuff. It's more powerful than safety.

To be technical, it's an ad hoc peer-to-peer mobile network. The word safety isn't even
there. Safety is one of the things. And the applications have been run on this thing. But it's
potentially a general purpose communications infrastructure.

CHAIR DENARO: Hans, I'm not understanding how it's more than safety. Can you
help me with that?

DR. KLEIN: You can run any number of applications on this platform of this ad hoc
peer-to-peer mobile network.

CHAIR DENARO: It's only V2V --

DR. KLEIN: What's that?

CHAIR DENARO: It's only V2V.

DR. KLEIN: Right. But I think there's more than just safety applications for vehicle to
vehicle --

CHAIR DENARO: Okay, but the problem I have is your headline. It says NHTSA as
coordinator. That V2V can be used for the Yamaguchi cat scenario, where I'm passing games
between cars, is kind of immaterial to what NHTSA would care about. And it is irrelevant to what
we want NHTSA to do.

DR. KLEIN: Correct.

(Simultaneous speaking.)

CHAIR DENARO: I don't see how they want to be getting involved in that peer-to-peer network for other things.

DR. KLEIN: Right. So NHTSA doesn't care, but NHTSA is not into the peer-to-peer network business. NHTSA is in the safety business. And that's the justification here. There's a risk in this in that the single use justification, we're really justifying this in terms of safety, may in some ways get hardwired into the system in ways that we might not recognize up front that in the future could constrain the system.

When a future use says fine, we achieved our safety benefits, it turns out we can use this for other features. Also some of the design parameters for safety are constraining future use. It's a possibility. Actually Andreas Mai did touch on this one. His terms were if you use a single use case there's a risk in using a single use case to justify a general business case.

CHAIR DENARO: Well, the one problem --

MR. MCCORMICK: There's another point that we started to raise just a minute ago. If NHTSA ends up becoming a kind of network innovator, there may be a mis-match between a safety regulatory agency giving birth, or somewhat overseeing, a general purpose communication network.

And right now it looks very promising that there's an agency to solve the coordination problem moving forward. Ten years from now there might be, oh, the safety mission of this agency is actually constraining the development of an infrastructure that's more powerful than
safety.

Some recommendations coming out of the group. I think that the more we talk about this the more we like it. And someone's reaffirmed the NHTSA approach and the idea of this achieve coordination, get everybody to go at the same time.

The bet has been placed and we support it. On the other hand, don't allow safety functions to unnecessarily constrain the general function of the network. Keep that in mind when going forward. Yes? It's a safety network.

CHAIR DENARO: You made the point that there could be other things V2V, and if you only focused on safety you may lose doing those other things.

Isn't it also true that eventually if you expand this system to V2I you want to make sure you have a system architecture system designed that doesn't rule out certain V2I functions as well.

DR. KLEIN: Yes. Keep it in mind that at the end of the day you'll get the most benefit from a general purpose communication platform. Respect the layered model even as we implement on the basis of certain functional points.

CHAIR DENARO: Yes. The problem is that some of these things you want to do are within the same layer. So you're almost talking about make sure the stations have some level of extensibility.

MR. MCCORMICK: Well, here's the problem. You're talking about a licensed device.

CHAIR DENARO: What's that?

MR. MCCORMICK: You're talking about something that's licensed for use in the spectrum. And it's licensed for use in the spectrum for a specific function.

Now, how the spectrum was initially allocated it said that, and you can use it for other
things that don't compete with other commercial activities, so you can't do chat, or telephone
messages, but something that there's not a competitive commercial activity going on for now you
can do on it.

But now put it in light of the conversation about the people that want to use unlicensed
devices on this spectrum.

All of a sudden you're saying that there's a whole bunch of other things we can do with it.

Yes, that's what the unlicensed guys want to do. But only the licensed people get to do it. I think
that's worse.

DR. KLEIN: Well, exactly. This gets us into it, because down here there may even be --
and first of all I want to cover this point.

Obviously people are aware of this, clarifying NHTSA's role, it gets into network
governance. But a little bit of a funny evolutionary path that NHTSA might be on. I assume
they're aware that. We should keep an eye on that.

But we had better understand V2V as a new broadband infrastructure. It's Scott's point.

It's looking like those guys who want to have unlicensed, they want to use the 5.9 gigahertz as
general purpose communications.

Actually, in some ways, are we so sure that's an incompatible vision with DSRC vehicle to
vehicle networks that in the near term future could become general purpose broadband for
communicating.

So there may be a way of conceptualizing this. Are we really doing last mile to the car?

And I'm going with the term last mile. It's a big term in broadband.

There's concerns in the broadband policy arena of all monopolistic market structure.
There's not been providers, it's hard to get new connections to the end user.

And in some ways this argument, well, we need to have unlicensed broadband to catalyze this network, network and ecology. Possibly this program actually contributes. It's not a viable, it's a contributor to that vision.

And that might get to stronger end in the community, the broadband community or the FCC community. And we ride the broadband tsunami, communicate that's significant. This is more big picture thinking.

CHAIR DENARO: But I would still say, the last mile in the car and all, it still seems to be more relevant to me when it's V2I. V2V basically has only one reason why there's a connection. As far as I understand, there's only one reason why it has a connection to the infrastructure. And that is solely for the certificate, generation, transmission --

DR. KLEIN: Actually, without having an --

MR. CAPP: Is this your diagram in front of me?

CHAIR DENARO: There's no reason why it's prioritized to be first. But it's every intention on V talking to intersections and things like that, because someday --

DR. KLEIN: Or even connecting with cellular. And if your dashboard will be connected to cellular --

CHAIR DENARO: That's what I'm saying. As long we call it V2V, that's all it is, right.

Once you explain that to anything else, we're now into V2I.

MR. MCCORMICK: Not really. Because once you broadcast that it's received by another moving device versus a non-moving device is something you can't prevent.

That's part of the whole definition. If you have a phone with the capability on it, it
becomes an OVE if it's moving. And it's an RSE if it's stationary. So it could be received by
anything that's able to receive it.

MR. FEHR: One other thing, Bob, to remember, is the physics of the moving vehicle.
That's the differentiation between DSRC and wi-fi.

The DSRC will work between a vehicle driving 70 miles an hour and a gateway device
stationary. Wi-fi probably won't. So each has a purpose in the context of whether the vehicle is
moving or not moving.

MR. STEENMAN: I'm going to pick up on what you're bringing up of a broader
viewpoint, which is if you have thousands of V2V vehicles in, let's say, a 50 mile radius, you could
hop through the network, and I could send a text message from Car 1 to Car 5 in the car zone. You
can build a mesh net, a cell-sustaining, cell growing mesh net.

DR. KLEIN: Yes, you're building a mesh network. I see what you're saying. And guess
what, it's a mesh network that's not owned by one of the giant communication companies. It's
possible you're getting some new entrance, finally, into the broadband market, which would
actually be a quite positive thing, as seen by the FCC and others.

MR. STEENMAN: And that's the, I think, stage operational thing that cars go down.
You could mesh the thing across cities.

(Simultaneous speaking.)

PROF. RAJKUMAR: So again, my theses have explored this particular topic of mesh
networks. Another question that I see Bob raising is that is that really the scope of our charge.

That's a question I see there.

MR. STEENMAN: No. I think what Hans was saying --
CHAIR DENARO: I'm just trying to keep our terminology straight here.

I'm just trying to keep the terminology straight, when we are we operating in V2V space versus when have we gone over to V2I space, that's all.

DR. KLEIN: And I would say at the moment the V2V, V2I conceptual framework is coming out, the transportation policymaking, and the idea of layered broadband is coming out of the network sector.

I think they're just two ways of looking at the same phenomenon. We might not be really thinking of this. Are we building a broadband mesh network? And the fact of the matter is, in some ways, yes.

CHAIR DENARO: Well, and we eliminated certificates. And if we decide we don't really need that, there was zero reason for this ever to communicate with the infrastructure. It was strictly V2V. It's peer-to-peer, car-to-car, we're good.

MR. STEENMAN: How could you implement like a traffic density manifest system?

CHAIR DENARO: Now you're getting down into V2I.

(Simultaneous speaking.)

DR. KLEIN: The recommendation is keep this in mind. Right now it's kind of a novelty. Over time this could emerge as potentially a significant thing.

I think some parties have referred to V2V as an enabler. This is a different way of saying that V2V is an enabler of other factors. And in terms of a communication strategy, possibly portraying what JPO is doing in terms of contributing to the broadband sector might be a useful point at a certain time to make.

Okay. Recommendations, of course incentives when it comes to implementation, what
are the incentives? What are the benefits out there?

We know this, but nonetheless there are some places where you don't need full
deployment and you can still get benefit. And we're eager to identify every incentive for adoption
that's out there.

So maybe really make sure that we fully understood the insurance industry, fully
understood the toll payment -- this, I think, we understand better -- other applications that allow for
incremental implementation.

I haven't asked this question of our colleagues from JPO. I know that they have been
pursuing this. I'm not sure to what extent. This is Scott's point. Make performance standards not
technology standards. Everybody gets that point, I guess. And this is the area possibly, this came
out strongly yesterday.

We talk about it often. We're in a DSRC for V2V and ITS. If you tell that to your
average tax payer or citizen they're like, really. What is he doing?

And what we're doing is we're saving lives, an Internet of cars, something like that. I
haven't heard an easy narrative. If everybody in this room pulled out a piece of paper and wrote a
simple understandable sentence about what this program is, I think we'd have 20 different little
sentences.

And it would be nice to get the easy phrase or concept that's understandable to everybody
about what the program is.

MR. MCCORMICK: Yes. But I have a problem when you start characterizing it as the
Internet of cars.

DR. KLEIN: Saving lives is a little better, right?
MR. MCCORMICK: Yes.

DR. KLEIN: Saving lives is the --

MR. STEENMAN: He's just making a general point that we don't have a good narrative.

MR. MCCORMICK: Yes.

DR. KLEIN: But I think it's a good narrative.

MR. MCCORMICK: Yes, you're right. I agree. Alphabet soup doesn't work.

MR. WEBB: Can I get an understanding on picking up the wrong terms that are probably going to be incorrect to use?

But as we're using these certificates, as we're traveling down the road with the privacy, we're talking about anonymous, and maybe that's not the correct term we should be using. But that's what we're trying to sell out to the public.

When it comes to toll payment, I can't be anonymous. So what am I using to broadcast? Is it not DSRC? Isn't DSRC different from what my anonymous is?

DR. KLEIN: Without getting into the technicalities, one doesn't venture an answer on this. I think I did anonymously tell you my credit card number. On top of all this anonymity, I say, hey, it's me and here's my credit card number riding on an anonymous platform.

MR. FEHR: We actually worked out a process for doing that. An anonymous vehicle approaching a point and conducting a secured and reputable transaction.

And it's all in how you actually protect the data as it goes over the air. So an anonymous vehicle can approach a toll collection point and in a proper fashion can exchange that information so third parties can't observe it.

So the anonymous car drives away, it has a record of the transaction. The toll
agency has a record of the transaction, and everybody's happy. And third parties have no idea what happened. So it can be done.

MR. KENNER: I'd like to just make a couple of points. One is when we talked about the security certificate management system, I think many of us think it requires the public element. If it was private only, I think some of us might have concerns, depending on who that private party was. And so having the oversight, I think, is helpful to some of us.

CHAIR DENARO: Let me make sure I understand what you're saying. You were saying that in this discussion of public, or private, or partnership, you were saying it's really important to have public at least part of that.

MR. KENNER: Correct. I would say that, versus a OnStar running the system --

CHAIR DENARO: I understand.

MR. KENNER: -- for example.

CHAIR DENARO: Got it.

(Laughter.)

(Simultaneous speaking.)

MR. KENNER: Now the second one that we didn't touch on there is that the other thing relative to market acceptance and speed is going to be the aftermarket devices, right. So one of the things for sure, we need to develop a performance standard for those devices and a level of conformity of production to make sure those devices are being manufactured to that standard. So there's another element.

Then another thing that we touched on just at the end of our conversation is that exploring harmonization of the standards in North America is probably the highest priority, meaning our
neighbors to the north and south, Canada and Mexico. And if they don't do it, fine. But if they do
do it, do it in the same way.

CHAIR DENARO: Let me just say Scott Belcher wasn't here this afternoon. But I know
he has some things he wants to contribute on that.

MR. KENNER: Indeed, yes. Steve?

MR. SILL: Let me try and offer something that I think Scott had offered before as well.

There are two different distinct types of standards harmonization we're talking about here.

One is the ability to harmonize such that you can use, say, a common hardware platform
for a vehicle from both the U.S. and European market.

Even though those vehicles will never drive in one another's territory, the cross border
harmonization is fundamentally different in the sense that you have to do at least some of it.

It's not optional. Otherwise, you can't cross the border. What you cannot have is a
vehicle that if it were to cross into Mexico would be transmitting something that would screw up a
fundamentally different Mexican V2I system.

So the nature of the harmonization and the requirements are very different in that assuring
cross border interoperability is a different level of harmonization than what you might do simply to
assure that you can use the same black box with a different software wiring for every car you build
in Cologne to sell globally.

MR. KENNER: Yes, well said. And really the North American focus, I would suggest,
the priority is more the cross border. I think when we start talking about the hardware
commonization, that becomes the total global, right. We would really like to have common
hardware in all our global platforms, whether it was in Asia Pacific, Europe, or the Americas, right.
So I think writing those two things down, I think, is important. And that will be something again that would provide, the cross border one, I think, is obvious.

I think the hardware commonality is one that the industry would benefit from. Because then we'd have it meet the scale, and so forth, associated with that, and minimize the challenges associated with building vehicles in Region Number 1 and then shipping it to all of the other regions.

And we'd like to have the same hardware with different software loads if possible. The last thing I would --

MR. MCCORMICK: I understand it's great for Roger if all you guys have common platforms. Because then you can build one thing --

(Off microphone comment.)

MR. MCCORMICK: I know, I'm just saying, you can build one for the regular one. But how does that advantage another OEM? If somebody has other functionality on their board that they want to accomplish, is it a minimum set of hardware? Or is it a performance functionality?

MR. KENNER: No. We want the same physical part number. So I build the vehicle in Spain, and then I ship it to the U.S., Mexico, Thailand, and Russia.

And I don't have to somehow swap out the hardware, or somehow now I have a complexity where I have to error proof the exact same box. And I've got 15 of them, because I don't have alignment. So I'd say that's the perspectives from which I was saying that it --

MR. MCCORMICK: I just wanted to make sure we were talking about physicality.

MR. SILL: Steve, just to be clear, but that part number that you want the same on every Ford Fusion for the global market could be an entirely different part than is in a different Ford
product or in a Toyota.

MR. KENNER: Right.

MR. SILL: So we're not talking about across platform. We're just talking about the
ability to use the same hardware in a given platform in multiple -- increasing the size of the market,
driving down cost, and then --

MR. KENNER: Speed up the size of the market.

MR. SILL: Sure. And that offers a public benefit, because if you're going to save lives,
the sooner you start doing it the better you've done.

MR. KENNER: And then the last point I was just going to make, relative to the market
acceptance and so forth, is the point that I think we made before.

But to be clear, we're all working on active safety functions, all the OEMs. We view that
as a point of competition between us in terms of what we offer, how we're able to spread it out
across our portfolios versus just high-end vehicles, and then the customer interface and how we
achieve that, right.

Then you have the vehicle to vehicle that we're talking about here. And then you also
have the autonomous vehicle in discussions.

I think we need to create some communications that are understandable by the general
public to be able to explain that. And it's really important, because everyone's confused.

We've all had the experiences. When I was testifying in Lansing a few weeks ago on
autonomous vehicles, they were clearly confused about the difference between vehicle to vehicle
and autonomous vehicles to be sure.

And when I speak at a variety of places, when I ask people how many people have forward
collision warning on their vehicles to support, either they don't know or they don't have it. So it's still relatively new.

MR. MCCORMICK: I'm just hoping they don't think they have it when they don't.

(Laughter.)

MR. KENNER: Well, usually it's the opposite. Usually they say, wow, I saw this light went off, and I heard this alarm, and it scared me. And I didn't even know my vehicle had it in it. I drove a Lincoln, I didn't even know.

(Simultaneous speaking.)

MR. KENER: What a neat feature, but I didn't know I had it. So what I think is really important is for us to align on, let's say, simple messages that we can say relative to what are the active safety features. What's the difference or similarity between that and vehicle to vehicle and autonomous.

Because as Dan mentioned yesterday, we view those all as one interconnected thing. And we're not going to stop doing one because the other ones are there. They're going to be complementary to each other and just expand the capability, especially when you look at it from a safety perspective, right.

And I think it's important that we don't confuse people about this replaces this, replaces this. But in fact these things are going to evolve, and they have to work together in harmony.

And some of them can do things the others cannot, which then expands our ability to be able to address some safety scenarios that today are things that cause accident injuries.

DR. KLEIN: Yes. You know what we need, is we need a standard message set.

MR. KENNER: Yes.
DR. KLEIN: So we're all saying the same things. We're all articulating things and we agree on them.

MR. KENNER: Yes, so anyway, enough said.

CHAIR DENARO: That was great, Steve. Thanks for doing it. Unfortunately, no good deed goes unpunished. So if you wouldn't mind writing those up a little bit and submitting it. So we'll get those captured.

MR. KENNER: Yes, will do.

DR. KLEIN: Oh, this is our last one on the private sector before going to the public sector. We did talk about it. We talked about the implementation using FMCSA.

Where you have a similar coordination problem, it's actually an easier one to solve. You're not dealing with the end user consumer. It's a more robust user population, a little smaller. They might be a very effective pioneer. That point was made.

CHAIR DENARO: Hans, do you mean FMCSA or do you mean the commercial vehicle --

DR. KLEIN: The commercial vehicle market, regulated by the FMCSA, has many of the characteristics of the light vehicle market regulated by NHTSA.

But if we're going to do cutting edge technology, it'll be a lot easier, I think, to implement it over on the commercial vehicle side.

CHAIR DENARO: Well, that falls in with Scott was just saying.

DR. KLEIN: It does. So I'm happy to reiterate. We are, I think, happy to reiterate that point.

CHAIR DENARO: And this idea of nomenclature and standardized terms, and more to
the point Steve just made about communicating the fact that even these words implementation, deployment, adoption, no two people, again, if we all define this on a slip of paper, would have a wide diversity of definitions.

I think really sitting down and hammering out what is meant by this, defining it once and for all as a standard, wasn't that by deployment, would allow people to talk, and communicate, and make sense of complex operations in a way that isn't ambiguous or prone to misunderstanding.

MS. HAMMOND: In our communications and outreach subgroup, we talked about the development, and this is something the JPO could do, is development of a tool kit of either terminology, or talking points, or infographics that anybody could use anywhere to help carry the message of what's happening and what's about to happen.

DR. KLEIN: Yes, communications tool kit. Because I'm struck at how often I personally really don't know what, when people say what are going to Washington D.C. for, it's like well it's kind of this DSRC kind of thing. Well, it's kind of a V2V. Am I alone in this or do others have this problem? And you've got the most --

MR. MCCORMICK: I just tell my wife I'm drinking somewhere else.

(Simultaneous speaking.)

DR. KLEIN: At the highest level I get a little tongue-tied just describing what I'm doing.

(Simultaneous speaking.)

CHAIR DENARO: The problem there was not really deploying anything right now. Under V2I you were, right. You were doing a deployment for the safety set.

But when they make a decision, let's assume it's positive for a minute, they're going to put out a requirement. That's not a deployment, that's an implementation. So I think that's very valid
to come up with at least a set that we agree upon.

DR. KLEIN: Okay. When I said the implementation occurs in the public sector and the
private sector, a little bit private with a little bit of public, we're familiar.

Again, it's all about institutions. Here we have lots and lots of local and state agencies
with relative autonomy of action. They're facing a large diverse and growing vendor supply
industry, a thousand flowers are blooming. It's a wonderful thing.

De facto innovation that's taking place. This is a really important point. In the two days
that we've been here planning the big picture, another 50 systems were implemented somewhere in
this country that we don't really know about that may or may not have anything to do with the larger
plan.

And this de facto bottom up organic innovation is happening in a very wide sense. To be
aware of it is important and to think is that something that this program could have a voice or could
contribute to, to doing it.

So again, there are problems of coordination. Will all those systems be interoperable?
Will they connect with each other?

Could you solve the coordination problem the way it's been approached with the private
sector? Would a regulatory approach be feasible? It's my understanding there has been a
definitive decision that's not the way that the AWA or DOT would approach it.

A standards approach rather than saying you must do this and that, at least having
standards, and there is a standards program that's addressing this subject as noteworthy and very
positive.

But the general challenge at the Federal level is to assist those autonomous implementers,
recognizing that there are only limited levers of control, often incentives rather than mandates.

So that we have to achieve some degree of consistency when you get a thousand flowers blooming and not much control of what's built up.

So the recommendations, accept that there's going to be incremental decentralized approach to innovation at the operational public sector level and figure out how to shape this process.

MR. MCCORMICK: That's a great recommendation. Did you say approach to innovation?

DR. KLEIN: Please figure this out. That's our main recommendation. Promote interoperability standards, which helps to rationalize the vendor industry.

It's comparable, remember our stereo sets when we had stereos. I can buy my speakers one place, buy my amplifier from another place, buy my turn table from another place.

Lo and behold, they quite reliably all interconnect. It is my understanding at the local level that is still a goal to be achieved. Is that correct?

MR. MCCORMICK: Right.

DR. KLEIN: But it's also my understanding that the standards program has addressed this. That's almost the fundamental thrust of current standards program -- Valerie, correct me if I'm wrong -- but to achieve modularization and interconnectivity. Is that a fair statement?

So I think recognizing that trend is in place is good. I started reading intensively the standards strategy and things like that. But I don't know it well enough other than to acknowledge some of the recommendations.

MR. MCCORMICK: Well, I think to reinforce that they're doing the gap analysis and to
reinforce the point that we look at it in North and Central America is a refinement upon going over
and talking to whatever ETC's doing, or SA Japan. That's interesting at best.

I think what they had just brought up earlier about we want to make sure we've done the
gap analysis, because you're not just dealing with automotive standards. You've got
communications standards, network standards, and to view the gap you can determine whether or
not we already have a standard --

(Simultaneous speaking.)

When you have a complex environment that has multiple variables, such as we're dealing
not just with automotive, we're dealing with communication protocols, we're dealing with
computational and networking issues, and back haul, all of those industries have standards.

They all have a number of things that exist. When you do a matrix and say, well okay,
what is it that I need in my space to communicate outside of the vehicle, or receive information.

And you can go through, and you can decompose that, and you'll go, well okay, we'll have
standards for this. But we don't have standards for this.

If you now go look to another environment, or have your counterparts in that environment
go do you have anything that's standardizes packetizing of information, or bundling, or unbundling
of something secure? And you find out, oh gee, you do. OSGI has it. Is that
something we can adapt and use? Because the last thing we want to have to do is create a new
standard.

I've run a standards organization. It's not fun. It takes a long time. And it's not
innovative. And so, you really want to do that gap analysis first. And Steve's doing it now, I
believe. He's working on it. It says, okay, let's look at what you need --
DR. KLEIN: Only find those gaps in the existing standard sets -

MR. McCORMICK: Yes. Because in order to standardize something, what you're doing is your finding the part that's non-differentiating to your end user.

If you have IP, or if you have capability, you don't standardize that. Because that's your business. That's what you add value for.

You find the part this is a common denominator so the industry can say I don't want to dedicate resources and assets to creating my little version of this part of it, because they don't add any incremental dollar value back to my product.

So you are standardizing things once you know where you're going. And of course that's part of the issue, is that we're not really clear exactly where we're going in all of these aspects. But we know in some of them.

DR. KLEIN: Okay, good, thank you. That's very helpful. So that gets into the promoting the interoperability, developing the standards, identifying the standards that are missing.

The public sector members of our committee made the important point, I would say, that they felt that sometimes the balance between investment in the public and the private part of the program, right now there's an emphasis on V2V, maybe more private sector implementation. But it would be appropriate to keep funding the early deployment approach. That approach has worked in the public sector where you fund -- again, recognizing that the locals will select it.

But the innovative approach, that is right for them. No matter what you tell them, they might know better, and in fact know that there's a certain approach that is good for their location.

But, still, federal funding for that kind of organic bottom up growth, possibly constrained
by standards considerations is through their approach.

CHAIR DENARO: Hans --

DR. KLEIN: Yes.

CHAIR DENARO: -- before you leave this, can I ask a question? As long as we're talking about the current program, V2V, and we're talking about DSRC, and we're not looking at other kinds of applications yet, you know there's an aftermarket version of the DSRC that JPO was promoting and so forth. My understanding is those aftermarket units are going to be subject to certification.

DR. KLEIN: Is that true, Walter?

MR. FEHR: Yes.

MR. McCORMICK: Is that true?

MR. FEHR: Yes.

MR. McCORMICK: Certification is?

MR. FEHR: Yes.

DR. KLEIN: Who's going to be a certifying entity?

MR. FEHR: That's what we need to figure out.

CHAIR DENARO: So doesn't that answer all of your questions there? We don't know what the details are. But doesn't that solve the standardization, the interoperability, and all that? That's what certification generally does.

DR. KLEIN: Well, I'm in the public sector part of this. This is more on the whether it's V2I or just plain old I.

CHAIR DENARO: Okay, all right. So that was what I was trying to get to. So as long
as we're in the V2V space, where we've got aftermarket devices, which we're going to use for that, because that accelerates all good things, and there's a certification process, I think we're good to go.

DR. KLEIN: Your point then is --

(Simultaneous speaking.)

CHAIR DENARO: I'm sorry.

DR. KLEIN: The certification process, maybe we can talk about that later. Because that's potentially a big deal.

CHAIR DENARO: Okay. Once we get to V2I, and there's now a way for various consumer devices to come on the system, then --

MR. BERG: They also must be certified.

CHAIR DENARO: I was going to say, and that's going to be on DSRC side of this thing. It's going to be certified regardless of what else it happens to --

MR. BERG: That may not be a public entity that certifies. It may be a private entity.

CHAIR DENARO: Sure.

MR. McCORMICK: Roger, we couldn't hear you, I'm sorry.

MR. BERG: Any device that's on this network would need to be certified. And that may not be a public entity that certifies.

DR. KLEIN: Who would it be normally, IEEE?

MR. FEHR: That's one of the activities our office is beginning to investigate. We set off some certification entities to satisfy the need for the equipment going into the monitored point. We learned a lot about that by doing that process. The next step is figuring out how we can set up, or cause to be set up, entities that will be able to do this kind of work, quite likely as a
commercial enterprise like in other communications areas.

MR. McCORMICK: Or you can do it as a non-profit.

MR. FEHR: University of New Hampshire, Wi-Fi Alliance, has a number of entities that
certify products to be less --

(Simultaneous speaking.)

MR. KENNER: And remember, depending on which device you're talking about, not
just certification, but then conformity of production as well.

CHAIR DENARO: For aftermarket prices?

MR. KENNER: Yes.

MR. FEHR: And I might even add installation.

CHAIR DENARO: I agree.

MR. KENNER: To make one that gets certified versus a conformity of production
requirement, it's a big difference.

CHAIR DENARO: Okay.

DR. KLEIN: This is again on the V2V side. Remember the distinction is on the
infrastructure side, back up on the slide, accepting a decentralized approach, that there's less
controls over on these 1,000 local operating agencies.

And I think that's not that, hey, we strongly recommend that you don't try to exercise
influence and harmonize this guy. But it's more like good luck.

You have to work with the reality, which is there are very limited levers over it. So if you
want to get something that works, it's going to be based on the premise that there's not much
influence, that there's a fairly decentralized approach.
MR. STEENMAN: That is in the deployment, not necessarily the implementation.

DR. KLEIN: When is deployment necessary?

(Simultaneous speaking.)

MR. STEENMAN: -- built the equipment and how you certify it and make sure you have production standards, while deployment is how you actually plant it on the roadside.

But I assume that across the country there's only a limited number of roadside units that will be produced. Not every state.

DR. KLEIN: The supply industry is small.

MR. STEENMAN: Yes. And not all the cities are going create their own roadside units or hang down things on telephone poles that they designed themselves, that need to be certified.

MR. KIRBY: Are you going to interact with traffic signals?

(Simultaneous speaking.)

MR. McCORMICK: It's more complex than that. When we put in the proving center, we went to put this device that would send a message to tell you how many seconds before the light turned red.

You had the city, you had the county, you had the state, you had a box that you wanted to get a hold of their back-haul and their power. You wanted to be able to transmit off the top of that tower and not generate interference, Wi-Fis, going all over the place.

It literally took us probably three days to install it, took us three months to get the approvals. And it is just that complex.

DR. KLEIN: Institutional complexity, it is very complex.

MS. HAMMOND: Right, you could, if a state or a region was motivated and wanted to
do it, they would do all that coordination themselves, amongst each other, and say let's go.

MR. KIRBY: So that's -- hopefully you can create that incentive for them. They're going to see the benefit to go to that trouble. But if they see it, they will do it. That's what you --

MS. HAMMOND: And they'll try and get money to do it.

MR. KIRBY: Ah, there we go. That's what we want, right, some people.

MS. HAMMOND: Yes, and they do.

DR. KLEIN: The early deployment mechanism, we felt in the committee, was discussed as a way to incentivize that kind of cooperative, competitive behavior that has worked.

MS. HAMMOND: I just think it would be important that anything that, even if it's created or thought of locally, or within a state, that for it to be able to be incentivized or funded it has to be transferrable to other conditions.

It doesn't do us any good, the feds, to fund something that isn't replicable elsewhere, or advances the state of the art. So somehow that should -- maybe that goes without saying, but it --

DR. KLEIN: Well, no, but that's exactly the point. I think that's a really important point. So replicable is important, replicable, diffusible --

MS. HAMMOND: Yes, whatever the word is.

(Simultaneous speaking.)

DR. KLEIN: Okay, I'm going to wrap it up quick because we're running out of time.

Recommendations, well, how about that. Do I deliver on what I say or what.

(Simultaneous speaking.)

DR. KLEIN: Okay, if I finished before 4:00 p.m. I'm very happy.

MR. WEBB: On the public side, you had a slide with problems up there, or issues, or
whatever.

DR. KLEIN: Way back at the front?

MR. WEBB: Yeah. And I think that while you touched on it when you got into the public, I think the funding is obviously an outstanding issue at all times.

Outreach Communications/Promotion Plan Subcommittee Report Out

DR. KLEIN: At all times, yes.

CHAIR DENARO: Okay, we do have one other group presenting. Did you guys decide on a spokesman?

MS. HAMMOND: George.

MR. WEBB: You're stuck with me. I'm supposed to be the only one here.

All right. I'm going to make a summary out of this. The first assumption is that it is analogous to the DOT's comprehensive outreach plan.

Overall, we're encouraged by the safety pilot testing. DOT may want to use accurate message in the preliminary plan developed as far as getting the message out. Same thing for the last bullet, in developing any communications planning, it is important to clearly distinguish connected vehicles from other proactive. We talked about that. The connected vehicle is intended to supplement some of this.

We also talked about the point of not overselling. We have an 80 percent number that's been kicked around a lot, that there's some concern about too much emphasis on that.

We had some short term and some long term. Here's the short term, identifying the near term communication PR needs, for the pre-decision for NHTSA, reviewing the media coverage for the safety pilot, identify what worked and what didn't, what message resonated the best and who
carried it.

We recommended develop an outreach strategy for all key stakeholders, including other federal agencies, blah, blah. You guys can read it up there as well as I can talk.

And finally, I think the last one was really interesting and important: to accumulate a repository of media coverage of connected vehicles and track what we're getting out there.

Our long term actions: identify the long term communications and PR strategy, emphasis on transportation agencies, acquire the services of communication professional or firm to assist in an overall communication strategy.

We know that's tough on the federal level. We got the message very clearly that they don't hire, for the most part, advertising firms or PR firms. But depending on where we're going in this, we want to encourage getting that out.

We also understood that within the Department of Transportation, JPO has got a staff of one for their PR communication. NHTSA is more the face of the communication of the public.

So from the standpoint of if NHTSA does take the lead and starts doing the rulemaking stuff, we think that they have the capability to get the message out and to provide that as part of the Department of Transportation thing, probably not out of the JPO office, as far as the extensive PR stuff.

And we're also very careful in this, that we understand the federal government cannot lobby. So the next to the last bullet about utilizing the committee members' existing networks and communications channels as champions, we think that's extremely important, particularly with some of the issues we've got coming as far as the FCC and the NHTSA. And I'll get to that at the end.
Develop and test the messages on a targeted audience. Five key bullets, we've talked about them, we're just going to reiterate. Cost, what are the specific public, private roles, even as we talked about in the issue of the certificates, OEMs and aftermarket, what overall regulatory philosophy is most appropriate.

And again, we may be in silos, what is it in V2V versus what it is in V2I. I think Hans covered that as far as trying to incentivize some of the stuff.

MR. McCormick: I don't understand the third bullet. I mean, some aftermarket suppliers are OEM suppliers. Where are we going with that?

MR. Webb: I think that we just put it out there as far as trying to incentivize some of the stuff, the concern would be aftermarket needs to be an important component. Because we want to try and get penetration.

MR. Kenner: So are you talking about in vehicle systems versus the aftermarket?

MR. Webb: Yes.

(Simultaneous speaking.)

MR. Webb: And for the recommended memo, whatever you want to call it, RITA, JPO. Again, initiate a research project supporting the development and implementation, the ITS Connected Vehicle Program and promote effective messaging. We talked about the communication professional.

Chair Denaro: George, would we say it that way or in general as with the DOT, based on what you said earlier, that maybe NHTSA does that.

MR. Webb: Probably DOT.

Chair Denaro: Okay.
MR. WEBB: Yeah. In fact I was just hitting it on the fly here. And to be consistent, again, trying to determine if we need to have the overarching comprehensive communication plan.

We're back again. We had some interesting discussions, because who are we trying to reach? Are we trying to reach technological groups? Are we trying to reach the general public?

What broad range are we going after as far as doing that?

And I think that we said that right now we understand, and the outreach has probably been more to technology, I think. We heard that -- Valerie was saying they probably make eight or ten trips a year, presentations or whatever, trying to continue to have the message out.

They have a very active web page. They even got an award, I guess, you guys, for the most active hits or something like that. That's great.

But as a matter of course, I don't think that's something that in everybody's busy day, it's like, I think I'll just jump on and see how the safety pilot or --

(Laughter.)

MR. WEBB: -- that we think about as a wrong course of business or whatever. One of the things that we did come up with is this one. I didn't make the pro forma, the bullet.

We're recommending that in the letters we're going to be sending, that we may want to talk about getting contact with the stakeholders and the public about the two key decisions that are going to be in process, the FCC and the NHTSA, out there as part of the letters that we're going to be putting out.

So that was important. And I just went ahead and copied that communication tool kit out there. There was a discussion, I think, that Mike is working on that, and Valerie's office, as far as trying to make that happen and start seeing it come together.
So that'll be something that will be just reaffirmed that we think that's an important thing as far as message. And, Hans, I think we agree. The whole consistency of message, of how we use the words, and what do they mean to us and to others when we're explaining it, is very, very important as far as trying to keep it consistent out there. And that was it.

CHAIR DENARO: Thanks, George. That makes a lot of sense.

MR. BERG: Who is the target audience for this outreach?

MR. WEBB: Yes.

(Laughter.)

MR. WEBB: No, we struggle with that, because just that. Are we trying to get it to the transportation engineers in the public agencies out there? Are we trying to get it to their administrators, the guys controlling the purse strings somehow? Are we trying to get it to elected officials at the local levels? Are we trying to start dealing with it at state legislatures or whatever? Are we trying to talk to Congressmen?

And it's multi-faceted and each one is a little bit different as far as what target audience and what we might say to whom.

MS. BRIGGS: Of course we have many audiences. Our website is really going towards a technical audience, towards technology transfer of the products that we develop through the research.

But of course there are multiple facets of the program. But we are a research organization, first and foremost. So I think we have traditionally viewed our communications role as communicating the results of our research to the community that needs it, as our first role.

So as a state DOT person, while I was hearing the presentations yesterday, while all the
technical and detail work is being discussed of what needs to happen, I kept hearing the word "it's political, it's political, it's political."

And the first thing I'm thinking is do 50 CEOs of DOTs around the country know enough about this FCC decision and the threat to success of the program? Do we understand it? Are we talking to our Congressional delegation? Are we starting to raise the visibility? Because it would be important to us.

MR. McCORMICK: I am one of the five members of the Congressional ITS Advisory Board. There's only five of us, but we, on an annual basis, prepare the 56 members of Congress and Senate a list of what these technologies are and what they benefit for.

I would give that whole effort a D in terms of viability, just because there is no champion for transportation on the Hill, partly because anything you do in this space benefits both parties at all levels of the organization, from the lowest burg to the federal level.

So there's no differentiator from one party being an advocate over another. I just haven't seen it and I haven't, in the last seven years, gotten any traction through anybody in Congress or the Senate on this.

MS. BRIGGS: Well, I disagree.

MR. McCORMICK: But I think the problem has partly been our message. And I think that's why I really liked that last item you had there, that said we need a tool kit. If we have those things that we can craft a message, that it's not me or you or whatever trying to sell the same message, that we can say who's your audience, go into that tool kit, pull that thing out, that's huge. I like that.

MS. BRIGGS: Well, I think that's right. But back to Congress, state and local reps and
agencies have a relationship with their Congressional people who, in some states, are very well placed and could care if they know their constituency cares.

And so they don't listen to the tradespeople. I don't know. I just think that we don't have the messages, or the words, or even the understanding of how to communicate this issue.

MR. McCORMICK: Yes. And I would agree that we haven't provided those. We haven't done a good job of getting that message to that level.

CHAIR DENARO: So I think we've defined a nice juicy area here for a gap, and therefore a recommendation. Because, like what Valerie said, they're a research organization. They know who their audience is and what they're supposed to do and so forth. So, hey, DOT, you've got a gap. These guys are going to do their part, you know, bet then the rest of the forest is silent.

So we strongly, as a committee, believe that this thing needs substantial communications. And you, DOT, need to figure out who and where that's going to occur and then put together that program. And let's all take a look at it.

MR. McCORMICK: I think that messaging that they create will be tremendously useful for the general public.

CHAIR DENARO: It's essential.

MR. McCORMICK: Because the messages we have aren't useful.

CHAIR DENARO: I think we, at our first meeting we agreed that was it. So I like that idea. Let's capture that.

MR. WEBB: But I think it was Steve that was mentioning about the whole idea again, and what I talked about earlier, was the broad overreaching thing is autonomous vehicle, or
connected vehicle, or internet vehicle, or whatever, you know, when you mention those terms
everybody's got a different vision.

Oh, these are the ones that drive themselves, or I think I see a Ford commercial connected
to the internet already when they get in their cars and whatever. So what does this do different or
better or whatever?

CHAIR DENARO: That's why you put in an engagement plan. You've got to get some
branding and some messaging going and stick with it. Yes, absolutely.

MR. KIRBY: There are visual ways of communicating this vehicle to vehicle thing, and
distinguish it. We've got plenty of pictures of Google vehicles running around with people hands
off the wheel and all that.

What we need are vehicles with little grills, and lights flashing, and another vehicle with
lights flashing, and then some action being taken. It's not that hard to conceptualize.

CHAIR DENARO: I agree.

MR. KIRBY: I mean, you've got your Ann Arbor thing, you could illustrate that in a way
that would distinguish vehicle to vehicle from the Google vehicles.

2013 ADVICE MEMORANDUM DISCUSSION AND WRAP UP

Committee Products from this Meeting

CHAIR DENARO: Okay, I think we're all anticipating an event here called adjournment.

But before we get there, I want to get a couple of things done. And it'll take a few minutes.

First of all, I wanted to summarize where we are right now in this. The request is those
subcommittees who have put some work together, I see a fairly large diversity of where we are right
now from subcommittee to subcommittee.
So let's get this all on the same plane and get those recommendations. I would like to see writeups of these going forward so that we can put them into one document.

I will send a template to all of you saying here's -- I'll write up one of mine, and say here's what I'm looking for. If you disagree, and you've a better way, please let me know. That's fine. Otherwise, as soon as we agree on a template let's all stick to that. That'll make it a lot easier for all of us.

And then, please execute on that. I think we need to decide on a date for this first draft, really rough, but first draft of the writeups of these recommendations. I'm open to suggestions.

MR. McCORMICK: Christmas.

(Laughter.)

(Simultaneous speaking.)

MR. BERG: July 4th.

CHAIR DENARO: Fourth of July.

DR. KLEIN: For the writeups of these presentations?

CHAIR DENARO: That's what he said.

DR. KLEIN: I'm not getting the -- everyone's got their own style. And you're going to spend an hour on this. Is it going to be by Monday, or by the Fourth of July, or by Christmas? It's an hour. While you're waiting for your plane is the time when you can knock this out and have a great weekend.

MR. McCORMICK: Well, I would offer the end of April. And the reason is there's a number of industry things going on. We've got the SAI World Congress, everybody's got other things that we ought to do.
I think giving until a month, gives us time to craft it, to circulate it, to re-craft it, depending -- I mean, yours is done, so we're good.

CHAIR DENARO: I'll take that, Scott. Anyone disagree, end of April?

MR. WEBB: Well, now, are you going to send yours out and then --

CHAIR DENARO: I will send mine out within 24 days. Given that I meet that schedule, you will send back to me --

(Laughter.)

CHAIR DENARO: -- things by the end of April.

MR. WEBB: I'm just looking at my own calendar. I'm being very parochial here. I'm looking at what I have to do.

CHAIR DENARO: No, no. You've got a win. Okay, so end of April, got it. So we'll do that. Because we do have quite a bit of editing to go with this. We've got a bit of work to do then, even more than I thought.

Okay, second thing I wanted to accomplish, then, is I want to walk through all these things we've got on our plate to figure out how we're going to do it. What we just decided --

MR. STEENMAN: We're going to assign it to all the people who have left.

(Laughter.)

CHAIR DENARO: To his credit, although I won't use his name, one of those who just left, he said I can sign anything I want to for him even though he's gone. So I told him to be careful what you wish for.

So we just handled our end of year memo. That's what we're working on. And end of April we're going to have the first draft of these new recommendations. And we'll keep working
on that. I'm going to the easy ones first.

And the second one, we have the spectrum memo. And we already have -- Hans, you're leading that, right?

DR. KLEIN: Yes.

CHAIR DENARO: And we have volunteers on that already.

MR. McCormick: And an editor.

CHAIR DENARO: Give me some ideas on dates. Because we're in the 45-day window thing, right?

DR. KLEIN: Right. No, I'd like to get it out to committee, that I'll do faster than this stuff here. So I might try to get out a crude, at minimum the bullets or something, out like today, frankly, just so that people have got something there.

CHAIR DENARO: Well, I think you ought to work within your subcommittee first.

DR. KLEIN: Yes. No, to get out to the subcommittee.

CHAIR DENARO: Okay, okay.

DR. KLEIN: I'm going to target for today just to get this off my plate and record what was there.

And then ITS America did give us a draft memo of this that said, no, don't just cut and paste ITS America, but we can look at it, at minimum a template.

CHAIR DENARO: You don't have to ignore history.

DR. KLEIN: So the question's can I get that out before I head to the airport or while waiting at the airport.

CHAIR DENARO: My question is, what I'd like to hear, is when would you like to
commit to a draft --

DR. KLEIN: Out of committee.

CHAIR DENARO: -- to the committee, to the broader committee for us to review?

DR. KLEIN: Our hard deadline is for a month out.

(Simultaneous speaking.)

DR. KLEIN: End of April our subcommittee gets it back to the committee.

MR. McCormick: Okay, so that's the same time as everybody else's.

DR. KLEIN: We're cutting it close, and let's move it a little further forward. Yeah, third week of April. Are you going to write these up and post them?

CHAIR DENARO: Yes, third week. Okay, the other one was then this NHTSA memo that we want to write. And a long time ago now, we had a discussion at 8:30 yesterday on that.

What we need is someone to take the lead on that and do a draft and decide where we're going.

MR. BERG: What was that again? What was that about?

CHAIR DENARO: This was the fact that, and we can change our minds about this, but we thought that we wanted to write something through JPO but directed at NHTSA saying regarding your decision to maybe do rulemaking here is some, well, I'll use the word recommendations, here's what we're saying.

And it's something of the nature of, I thought it was just to move forward. What you're doing is important. Don't back off of the tough decision of making a rule, yada, yada, accelerate, whatever those things might be.

MR. McCormick: That's going to mirror what I'm writing for the commercial vehicle.

I'll just volunteer to write both. And I don't have any ownership in the wordsmithing. So don't
hesitate to critique it.

CHAIR DENARO: Now, the commercial one we agreed, and I like it a lot, we're going
to put that into our final memo.

MR. McCORMICK: Right. But I'm just saying, as long as writing one, I might as well
write them both. And we can wordsmith them.

CHAIR DENARO: But I'm thinking that there's nothing wrong -- so I'll throw this out to
everyone. I hadn't thought about that. Since we are going to write a letter to NHTSA that's
separate anyway, why not make your proposal about commercial vehicles be part of that letter we
write, even though we're going to separately put it, because our letter's coming after they've already
done whatever they're doing in the fall. So this was an idea to get something earlier.

MR. McCORMICK: Yeah, I'm fine with that. I don't care.

CHAIR DENARO: I think that part of the letter's not a bad idea.

MR. STEENMAN: Mostly from what I remember the discussion was about encouraging
them to do as much as possible and not go to the one side of the spectrum, which is like let's
postpone everything for five more decisions.

CHAIR DENARO: And on that same page though, and that's what I would like to see.

MR. STEENMAN: And I'd do the same thing, and I'd highlight the commercial vehicle
thing in there.

CHAIR DENARO: And then, oh, by the way, the commercial vehicle.

MR. McCORMICK: When we’ll be able to get the minutes, since I didn't take copious
notes?

(Simultaneous speaking.)
MR. VELEZ: We'll have the transcript in ten business days.

MR. McCORMICK: Transcript's not bad. I've been through them.

CHAIR DENARO: That's fine. Whatever you've got. I just need --

(Simultaneous speaking.)

CHAIR DENARO: Okay. So you'll get us a draft on that, Scott? That's great.

MR. McCORMICK: Yes. I'd get the draft on both of them. I'll put them actually in the same document.

CHAIR DENARO: And that's not as urgent as, for example, the sharing memo. Because we said last meeting we weren't going to do this, that we need summer-ish for that kind of thing. So we want to finalize that memo, let's say, June or July.

MR. McCORMICK: Oh, I'm assuming I delivered it the end of April with everything else.

CHAIR DENARO: Okay.

MR. McCORMICK: I want some deadlines. Give me one.

CHAIR DENARO: All right. Then that leads us on to three more things. And these are the requests that Ken asked. The first one, permanent report to Congress, and that's what we're doing, so that's already done.

Second one is strategic planning, comments to him on what might be in the strategic plan. There's some themes and stuff that are in our head, that's all.

I'll volunteer to head that up. During the discussion I think you had a lot of passion for this also. So I could lean on you for some --

MR. McCORMICK: We'll ping it back and forth on it.
CHAIR DENARO: You've got something on your plate with your writing there. I'll lead on this, but if I can lean on you for some others. Any others who would like to --

MR. BERG: I will.

CHAIR DENARO: Roger, okay. Anybody else?

MR. STEENMAN: Yes.

CHAIR DENARO: Ton, okay. Okay. So the date on that? What were you looking for, Ken, in terms of comments on the strategic plan? What would be useful to you? Because you're in the middle of doing that.

MR. LEONARD: We've just opened it up for public comment. And I haven't had a chance to talk to James. But I think it would be summer. So I don't think it could be later than the dates you've been talking so far. Fourth of July would be good.

CHAIR DENARO: Okay.

MR. STEENMAN: There's a strategic plan out for comment right now?

MR. LEONARD: No, no, the draft themes are out. We've opened up a website on IdeaScale to gather public input. We'll be doing that for another six months. But we are starting the internal drafting process. So the sooner we get input, the greater an impact you can have.

MR. STEENMAN: Okay, got it.

MR. LEONARD: By September, I expect we will be somewhat set in the themes we are writing to in the general outline of the document. So six months from now your input would not be as valuable.

CHAIR DENARO: So to show good leadership, not wanting to be the bad wheel here, I'll also get that in April, since you all have it in there. So I will have a draft of that end of April for
us then to collaborate on and move to a final draft by early summer if we can.

Second one is deployment initiatives report, and just to remind you, Ken was asking are there any creative ideas, be it tax incentives, be it other things, you know, what are some ideas from this committee? So I believe I may have a leader for this, possibly.

(Simultaneous speaking.)

CHAIR DENARO: I mean deployment. So Hans agreed to take leadership of that.

Anyone else?

DR. KLEIN: Our committee could play a role.

(Simultaneous speaking.)

CHAIR DENARO: Good. And we'll have to poll the others too. We'll send a notice out on these things for the others who had to leave.

DR. KLEIN: My understanding of the deployment incentives is that it's going to look a lot like our subcommittee report.

MR. BERG: Is this deployment incentives for things other than connected vehicle, am I right?

MR. LEONARD: I would say you can cover anything in the ITS world on that.

CHAIR DENARO: That's great, thank you.

MR. LEONARD: And we also have a much later due date though. Isn't it October?

Oh, that's the one that has no due date. That's right. It's the other one that is October 14th. So we've got some flexibility on that. Although obviously this committee session expires in December.

CHAIR DENARO: So just to spread things out, Hans, I hear what you're saying about --
DR. KLEIN: Yeah, remind in September on that one.

MR. BERG: But you can start on your brainstorming any time.

DR. KLEIN: Okay.

MR. BERG: You can bring it up again in the next meeting.

DR. KLEIN: Yes.

CHAIR DENARO: So why don't we just, so we can move forward to something --

DR. KLEIN: TBD.

CHAIR DENARO: No, let's put a date down for the first draft. And let's make it later than --

DR. KLEIN: September 15th.

CHAIR DENARO: What's that?

DR. KLEIN: September 15th.

CHAIR DENARO: Got it. Okay. And the last one is the most difficult one. Because I'm still not understanding it completely. And it's the DSRC implementation report. How do we want to handle that, Ken's request for that?

MR. McCORMICK: I'm not clear how we add value to that. I guess I'd like to understand a little bit more about it, of what it is you're looking for. That's where I am.

MR. LEONARD: In a sense, as I mentioned yesterday, you're going to be putting out a spectrum report that really may address some of the issues that we're going to have to address in our report back to Congress. And that may suffice.

CHAIR DENARO: Why don't we do this? Why don't I recommend this? Why don't we table it? Because a lot of this stuff that I address, we may pull out all that stuff.
Why don't we take a look at this combination of stuff we've got. And when you take a look at that and see some stuff then we'll -- not necessarily sharing, but let's take a look at all that and see if there's any gaps in what you need for that other thing. And then maybe we can be more specific about some gaps in it.

MR. LEONARD: That sounds great.

CHAIR DENARO: Okay. With that, I'm out of words.

MR. McCORMICK: I would like to go on record to say thank Ken, and all of us to thank Ken, for his time and his stamina. And I would like to, as a round table, see if you have any remarks for the committee. Was this valuable for you? Was it something you were looking forward to? Was it a complete waste of your time?

MR. LEONARD: No. It was absolutely valuable to me. I'll go back to what I said at the beginning. I really do appreciate having an advisory committee and recognize, just in listening to the report outs, that there are a diversity of views here.

That's important, because as this program goes out to the public, there's going to be an even more diverse set of views. There are going to be objections to what we're doing coming from quarters and on topics we could never imagine. And it's important to know those.

As I said early on, my goal is not to just have the greatest research office that doesn't do anything. I want to do research that changes the world.

And I think this program office and the work that we're all doing has that potential. But there are a lot of obstacles when you go to change the world.

So we have to think about those. And we have to line them up and set them up and work around the obstacles. Because it's hard to get R&D out into the real world.
In the private sector it's hard, in the government it's hard. The obstacles are different, but they're all there. So listening to everybody give their thoughts, volunteer their time, I really appreciate that.

If this were not worth my time, I would not have stayed for two days. I'm looking forward to the next meeting. So I don't know if you are, but I definitely, because I want to hear what you think about.

The only thing I would worry about is the end of that phrase, when a thousand flowers bloom, about a hundred schools of thought prevail. And then Mao started the re-education camp, so then everybody voiced their opinion, so --

CHAIR DENARO: And we absolutely recommend that.

(Laughter.)

MR. LEONARD: We won't be doing that here. But I do appreciate the diversity of opinions, and thank you all for your time. And I'm looking forward to the reports that you generate and your advice.

Next Meeting

CHAIR DENARO: Thank you, Ken, and Valerie, and Ton, and Steven for everything. One thing I did neglect to tell you, we do need to talk real briefly about meetings.

I've been going back and forth in my mind whether we need one more meeting or two more meetings.

So the work in front of us is by email, April 30th and so forth, we're going to see these first responses on a variety of memos we've got. We're going to circulate those. A lot of that work can be done there.
I think there is some benefit in getting face-to-face as we finalize the thing. We're all nodding at each other over there. Frankly, it's easier for me to drive consensus, as I said earlier, when we're face-to-face than it is, you all get a lot bolder over the email.

MR. MCCORMICK: I would offer that if we have two more meetings they don't both need to be two days.

CHAIR DENARO: That's a good point, that's a good point. So what's the deal? Give me some feedback. I think if we had two meetings, it would be one summer-ish.

And I know that's a challenge. But it would be July or August-ish. And the second one would be late October/November-ish. If we're going one, I'm thinking October.

MR. MCCORMICK: Yes. The one at the end of the year is the one I'm thinking might just be the single day one. Just because by then we ought to be done and we can declare victory and have a drink. Of course, that's my solution for everything.

(Laughter.)

MS. HAMMOND: Could the September-ish be in concert with another meeting? Is that something --

CHAIR DENARO: We found out it's pretty late in September. So --

(Simultaneous speaking.)

CHAIR DENARO: So is that a consensus? Do we want to have a two day meeting late summer and then a one day November-ish?

MR. MCCORMICK: Yes.

CHAIR DENARO: How difficult is, well, I guess August is better for me, but I'm pretty available either of those. Do we have to avoid either July or August, vacation schedules, things
like that?

DR. KLEIN: July's bad. August is a little better for me.

MS. HAMMOND: Yes, August is probably better.

CHAIR DENARO: So let's let -- is Steven still here?

MR. KENNER: I'm right here.

CHAIR DENARO: Oh, okay. So let's do a memo out there on this or something. And then we can find a date.

MR. McCORMICK: The only difficulty is September, is September's getting rather packed. Because you've got insurance telematics, you've got a three day event here, we have our summit. September is getting really kind of tight, even for one day or --

CHAIR DENARO: September is, for us, it's the beginning of trade-show season. So it gets really tough, yeah. Travel gets very tough in September. I agree. And these guys are back in school.

MR. GLASSCOCK: We've had some internal communication and we're going to do it at a hotel in Crystal City, where we're going to have a normal size room.

So the farther out in advance we can get it planned, the easier we can get something scheduled. So I will send a Doodle poll next week, if that's good. And we'll try to lock it in for August sometime.

MR. McCORMICK: And I do want to go on record thanking the reporter, and Steven, and Valerie, for all of their support at the meetings. Thank you.

CHAIR DENARO: Any last comments, questions of anyone?

DR. KLEIN: There's no chance of taking it back on something like this meeting in April?
There's nothing like that happening later.

MR. FEHR: We don't have anything scheduled. That's not to say somebody else in the office doesn't have anything.

CHAIR DENARO: We can take a look at any problems. We can always change in emails.

MR. GLASSCOCK: There's lots of stuff in September, but not July. There's some stuff in July. There's an automated vehicle thing in the Bay area.

CHAIR DENARO: Yes. I'm actually running a conference at Stanford in July on automated vehicles.

MR. GLASSCOCK: That's the one I was thinking about.

(Simultaneous speaking.)

ADJOURN

CHAIR DENARO: July 16 through 18. With that I declare us adjourned. Thank you very much for your contributions. Good meeting.

(Whereupon, the meeting was concluded at 3:37 p.m.)