U.S. DEPARTMENT OF COMMERCE
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NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION (NTIA)
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MEETING OF THE COMMERCE SPECTRUM MANAGEMENT ADVISORY COMMITTEE (CSMAC)

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WEDNESDAY,
MAY 19, 2010

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The Committee convened at 9:00 a.m. in Room 4830 of the Herbert C. Hoover Building of the U.S. Department of Commerce, located at 1401 Constitution Avenue, N.W., Washington, D.C., Dale N. Hatfield and Bryan Tramont, Co-Chairs, presiding.

MEMBERS PRESENT:

DALE N. HATFIELD, Co-Chair
BRYAN TRAMONT, Co-Chair
LARRY ALDER (via telephone)
DAVID E. BORTH
MICHAEL C. CALABRESE
MARTIN COOPER
MARK E. CROSBY

DAVID L. DONOVAN
GARY EPSTEIN
BRIAN FONTES
ROBERT M. GURSS
JULIUS KNAPP
JAMES ANDREW LEWIS (via telephone)
MIKE MARCUS

MARK A. McHENRY
DARRIN MYLET
RICHARD REASER, JR.

MEMBERS PRESENT (Continued):

GREGORY ROSSTON (via telephone)

R. GERARD SALEMME

JENNIFER WARREN

DANNY WEISNER

JULIE ZOLLER

ALSO PRESENT:

LAWRENCE E. STRICKLING, Assistant Secretary of Commerce for Communications and Information

PHIL WEISER, Senior Advisor to the National Economic Council, Director for Technology and Innovation

C-O-N-T-E-N-T-S

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

9:12 a.m.

CO-CHAIR HATFIELD: I'd like to welcome everyone to the Commerce Spectrum Management Advisory Committee. We've got a pretty full agenda, as I said a moment ago, that we need to get through. So, we'll go ahead and get started right away.

Bryan, you want to say anything?

CO-CHAIR TRAMONT: No.

CO-CHAIR HATFIELD: Larry?

ASST. SEC. STRICKLING: Just a couple comments.

Good morning and thanks to all of you for attending today's CSMAC meeting. I guess this is our first meeting since the FCC's Broadband Plan was released, so I think everyone, while we appreciate and thank you all for how busy and how diligent you all have been up until now, I think the Broadband Plan and some of the ideas that the FCC has raised for consideration are only going to increase

certainly our workload here at NTIA, and then, because of the things roll, your workload as well. And I'm glad to see already that you're starting to do subcommittees today with the Unlicensed Spectrum Subcommittee and the Sharing Subcommittee.

Sharing is, as you all will know if you've had a chance to read through the spectrum chapter of the Broadband Plan is going to become very important in terms of meeting our future spectrum needs. So, the work of this committee is just going to become more and more important as we continue to navigate our way through the growing and the explosive need for additional spectrum for commercial mobile broadband purposes.

So, thank you all for what you've done so far and thank you in advance for the continued work we're looking forward to getting from you all as things proceed.

What I would like to do though is take this opportunity to announce the addition

of three new members to the committee. One is here today. She's been fully enrolled and is a full-fledged voting member with all rights and privileges of the committee, Julie Zoller, sitting over between Jennifer and Gerry.

Also, and I think he may be on the phone, Larry Alder has joined us.

DR. ALDER: Yes, I'm on the phone.

ASST. SEC. STRICKLING: Welcome, Larry.

MR. ALDER: Thank you.

ASST. SEC. STRICKLING: And our third new member will be Susan Crawford. She's not here today, but hopefully she'll be a full participant by the time of our next meeting.

So, welcome to all three of you. Thanks for your willingness to serve in this committee. And so, we're always looking to get new folks added who can bring new skills, new perspectives. I think we're now at full membership, so we don't expect any new

additions going down the road. But I think we've got a very strong team put together now and I certainly look forward with working with the new members just as much as our continued work with those of you who have been a part of the process so far.

So, again, thanks to Julie, Susan and Larry for their willingness to serve, and I will pass the mic back to Dale.

CO-CHAIR TRAMONT: Just one. For the benefit of the folks on the phone, we probably should go around the table and have everyone indicate that they're here, and then also let the folks on the phone identify themselves.

So, with that, I don't know if, Mark, you don't mind starting us off so we can go around the table.

MR. McHENRY: I'm Mark McHenry.

MR. REASER: Rick Reaser, Raytheon.

MR. SALEMME: Gerry Salemme.

MS. ZOLLER: Julie Zoller.

MS. WARREN: Jennifer Warren.

MR. MYLET: Darrin Mylet.

MR. CROSBY: Mark Crosby.

MR. KNAPP: Julius Knapp.

ASST. SEC. STRICKLING: Larry Strickling.

CO-CHAIR HATFIELD: Dale Hatfield.

CO-CHAIR TRAMONT: Bryan Tramont.

MR. WEISER: Phil Weiser.

MR. CALABRESE: Michael Calabrese.

MR. DONOVAN: David Donovan.

DR. BORTH: David Borth.

MR. COOPER: Martin Cooper.

MR. EPSTEIN: Gary Epstein.

MR. GURSS: Bob Gurss.

CO-CHAIR TRAMONT: Excellent. And who do we have on the phone?

MR. ALDER: Larry Alder.

DR. ROSSTON: Greg Rosston.

CO-CHAIR TRAMONT: Anybody else on the phone?

(No audible response.)

CO-CHAIR TRAMONT: Okay. Great. Thanks, Greg, for joining us by phone.

With that, turn it over to Dale.

CO-CHAIR HATFIELD: Yes, I'd like to welcome our new members as well and we sure want to put you to work.

Okay. And Brian Fontes just joined us, right?

We're going to start today with --

CO-CHAIR TRAMONT: Who's that, please?

DR. LEWIS: Jim Lewis.

CO-CHAIR TRAMONT: Oh, great, Jim. Thank you.

CO-CHAIR HATFIELD: Oh, thanks.

CO-CHAIR TRAMONT: And Brian Fontes just joined here live.

CO-CHAIR HATFIELD: We're going to start with three presentations this morning, and the first, it's a real pleasure to me of course to introduce my former colleague at the

University of Colorado, Phil Weiser.

Phil Weiser, as many of you know, is at the Justice Department and recently moved over and is now senior advisor to the National Economic Council where he's director for technology and innovation. So, without further ado, Phil, I'll turn it over to you.

MR. WEISER: So, when people say if someone asked you to jump off a bridge, would you do it, generally the answer is no, but I think if Dale Hatfield asked me to jump off a bridge, I would do it. And when Dale asked me to come here today, it wasn't hard for me to say yes.

I have a habit every time I'm with Dale to embarrass him by acknowledging him and his leadership. It's easy to do on this occasion. Those who know Dale, know that for him his level of public service and willingness to make sacrifices to try to achieve good results is extraordinary. I've been privileged to work with him on previous

occasions and one of the parts of this job that I am looking forward to is being back in the world of spectrum policy and having a chance to learn more from Dale.

And Dale, with Bryan's help and now with Larry Strickling here, Secretary Locke, others at Commerce, really have an A team. You guys are an unbelievable group of minds and your willingness to spend time is a great service to the government.

One of the challenges in this sort of body that I am very aware of but I know you all are up to is to transcend your company hats and backgrounds and to engage on the merits in an intellectually honest fashion. Dale is very good at facilitating such discussions, as is Bryan and Larry, so I know that will help. But I also think this effort can only work in such a format. Different standards bodies that Dale has taught me about work when you get engineers talking, you know, to engineers as it were, and that's the ethos

that Dale I know is bringing to this effort.

I would agree with everything Larry Strickling said. Spectrum policy is getting more and more important. The earlier decisions about spectrum started from premises that spectrum was in plentiful supply and didn't take as much necessary time, care and rigor to think hard about how do you get this resource used most efficiently? We need that hard thinking that you all can help to advise the Commerce Department on. The Broadband Plan obviously sets out a lot of ambition that the administration is working through. Larry was being a little modest. He is co-chairing a committee with Scott Harris on behalf of administration thinking through how the administration responds to the Broadband Plan and its proposals, and obviously spectrum is a key part of that.

I would also just say that we really are looking for good ideas, and this body is well suited to help come up with them.

I'm very new to this position, but I'm not new to spectrum. The issues here are ones that I know are important and thus this is going to be a serious part of my time working at the National Economic Council.

So, I think that tees up a little bit what I'm doing and I'm here to listen for a little bit and to learn from your discussions.

CO-CHAIR TRAMONT: Thanks very much, Phil.

CO-CHAIR TRAMONT: And, Phil, thanks for taking the time. It's great to have you and great for the government to have you in service. Very lucky for the country.

With that, in prior CSMAC meetings we've had presentations from NTIA. Carl did a great job giving an overview of federal government spectrum use. Today we sort of have a bookend presentation. Juli Knapp from the FCC, a face familiar to all of us, was willing to come over and spend some time with

us this morning and talk a little bit about what's happening on the commercial side and public safety, as well as a little bit of an overview of the FCC's activities on spectrum following up on our preview last meeting of the National Broadband Plan.

So, with that, Juli, I think it's all yours.

MR. KNAPP: Good morning and thanks for inviting me to be here. I'm going to try to run through quickly a bit about what's going on with the Broadband Plan and the pieces of spectrum that we're focused on.

Just to set a groundwork, things really haven't been quiet on the spectrum side. There's been a lot going on for a number of years; I won't go through everything on the list, and I'm sure most of you are familiar with them. The 90 megahertz of spectrum that was made available for AWS-1, the DTV transition where we recovered spectrum for commercial mobile and public safety, 800

megahertz re-banding, on and on.

I thought a little bit about trying to compare this with what Carl did. There's no way I could go through the spectrum and talk about everything that's there. I have had in the back of mind wouldn't it be fun to just draw kind of a color-coded slide showing what's been going on in every band. It would be very busy.

I'm going to focus on the Broadband Plan, and particularly chapter 5 talks about spectrum. The predicate here is that the devices themselves are getting hungrier for spectrum and the applications are expanding. The Plan talks about national purposes, where broadband can support civic engagement, telemedicine, public safety and the smart grid. It's kind of a new phenomena. In the last few years we turn on devices and we're accessing app stores. I mean, just two-three years ago, that was not something that we really did.

Jumping to the next slide, and without going into detail, we have increased the supply of spectrum in the last few years by about a factor of three. The challenges that the devices themselves compared to what they had done just a few years ago are consuming about 30 times the amount of data that they had before.

In the Plan, it focuses on a number of issues: First, the lack of transparency in the allocation and utilization of spectrum, that the allocation and utilization data is largely unattainable and often esoteric. If you try to work with the universal licensing system, unless you're an expert, it's hard to extract the useful information about who is doing what and where. There are relatively few spectrum reallocation tools. You know, the traditional ones, you take from one service and give to another, or you share. We've done some things with secondary markets, but it's still a limited

set. There's an insufficient capacity for broadband at the rates that it's growing right now. We're already seeing the signs of strain on the networks and if the smartphones expand the way we anticipate they were, that's only going to exacerbate the problem unless we do something about it.

Backhaul, it's kind of in the background, which is a key for getting from the cell sites into the network itself. There's a growing need for that as well, and the options have been limited so far.

The access models are limited. We've only dipped out toe into the water relative to cognitive radio and it's possibilities, and so that's another thing that is worth exploring.

And the policy scope is too bounded. There's no framework for identifying future spectrum requirements and how we're going to coordinate both domestically and

internationally.

But the Plan laid our a framework for dealing with those recommendations. To ensure greater transparency, our first step was the spectrum dashboard. You probably know that congress has been very active in developing legislation. If that legislation passes, it certainly is going to give us specific guidance on the things that the commission will need to do to provide better transparency on the use of the spectrum.

Secondly, to expand the incentives and mechanisms available to reallocate or repurpose spectrum, we talked about incentive options. That is going to take legislative action and spectrum fees which would also take legislative action.

To make more spectrum available, the Plan set a pretty ambitious target: Within 10 years to make 500 megahertz of spectrum available in total for wireless broadband, and the bands that are under

consideration we'll talk about in a few minutes more; I won't go into it now, to facilitate deployment of spectrum for wireless backhaul, to examine more flexible rules for the fixed services, to expand opportunities for innovative spectrum access models, to identify a new unlicensed allocation or new spectrum for unlicensed, to provide for opportunistic use of the spectrum. In a separate entire chapter we talk also about promoting research and development, working together with the National Science Foundation to be able to develop and test these techniques. And lastly, to increase the comprehensive of our spectrum policy working with NTIA, address tribal issues and coordinate in advance our views internationally.

There are some specific actions. We looked at the Plan as kind of the first step in a process going forward. We identified some specific actions. These are

all rule makings to modify the rules for the wireless communication service to facilitate the introduction of mobile broadband and make available 20 megahertz of that. There's an item on the commission agenda scheduled for tomorrow where that issue will be taken up.

For the Advanced Wireless Service 2 and 3, it recommended that we work with the NTIA to consider whether the AWS-3 spectrum might be paired with spectrum in the 1.7 region, and we've been actively engaged with NTIA in doing that.

Talked about the D Block and public safety and recommended auctioning the D Block.

Providing more flexibility in the mobile satellite services to introduce ancillary terrestrial services, and we counted that for 90 megahertz.

And then probably the item that gets the most focus is providing access for TV broadcast spectrum and making available 120

megahertz there. And we laid out a schedule for these things in some detail.

Now, these are detailed slides. I just pulled it out of the Plan itself, because if I change a word, I know I'll change something significant. But anyway, we're planning to address the TV white spaces reconsideration and database opinion, we said in the third quarter. So, we've got that scheduled.

To identify continuous spectrum for unlicensed use, which is a challenge as well. We started talking to folks in industry. As most of you know, it's not as simple as it sounds. There aren't vacant blocks and you have to think about things like, well, how much spectrum? Where in the spectrum? How might that match up with things internationally and so forth? So, we've already begun some work on that.

For opportunistic use of the spectrum, we're planning to initiate an Notice

of Proposed Rule Making and I think we've got that late in the third quarter. And what is interesting there, this is not just about sensing of the spectrum. I think one of the ideas that grew out of the TV white space proceeding is that and what's new. Now, you've got devices that have some intelligence. They know where they are. They've got a way to feedback to a database connected to the Internet. You can have that database have some knowledge about what is supposed to be there, compare it with the readings it's getting back from the device, and perhaps develop policies that allow you to make more efficient use of the spectrum. So, we are planning to explore that later in the year.

And then also a Notice of Proposed Rule Making on experimental licensing. We've got a process in place and, you know, I think on the whole, although at times we've had delays, it's functioned well. But there are

probably things we can do to improve that. So for example, are there bands of frequencies that we could make available? For instance, we put them up in an auction, but nobody bid, could we make that spectrum available for experiments?

On the transparency front, the spectrum dashboard. So, we've introduced the beta version of it. Earlier, I guess it was last week, we had a session that was open to the public to get ideas on how we can improve it. We thought we got a lot out of that. And again, that would be informed if legislation passes. We'll be modifying this to address those things.

And sometimes buried down in all this, because there's so much focus on the specific proceedings, a really important point is we talked about developing a strategic spectrum plan and a triennial assessment of spectrum needs and how we're going to address them. And we would be working together with

NTIA in that process so that their efforts and the FCC's efforts are marching in lockstep.

We created a Spectrum Task Force; rather the chairman did. It's co-chaired by myself and Ruth Milkman, who's the chief of the Wireless Telecommunications Bureau. It includes the bureau and office chiefs that have responsibilities in the spectrum area. The primary focus is the implementation of the National Broadband Plan, but that's not the only focus. The Plan really; you know, we've said this several times, was a beta version. And the task force really provides a vehicle for the bureau and office chiefs to address in a coordinated way the issues that come up and also to explore new ideas as they arise.

And I'll just say a few words about the federal and non-federal coordination. The IRAC process which meets every couple of weeks, and the FCC sits as a liaison on that, we coordinate the spectrum actions through the IRAC under a Memorandum of

Understanding. There's really routine contacts that go on every day between the staff on spectrum issues and folks like Carla and myself coordinate our particular topics and issues. And when we can find time in our calendars, we always have as a goal to try to meet regularly. Sometimes the spacing is not as close as we'd like it to be, but the desire is always there.

We participate in the Policy and Plan Steering Group of the federal government and we work with NTIA in the federal agencies to study potential availability of particular spectrum bands.

So, that's a 50,000-foot overview. And I'd be happy to take questions if you have them.

CO-CHAIR TRAMONT: Juli, one of the things that comes up is sort of opportunities for sharing, which means federal government users, commercial users and public safety users. FCC --

COURT REPORTER: Sir, I need you to get close to the mic.

CO-CHAIR TRAMONT: Oh, sure. Juli, one of the things that our folks have been looking at is ways in which FCC regulatees can share with federal government users, and when they see potential opportunities for that, what's the best way to work with the FCC and NTIA to find those opportunities and more constructively get them done in a timely fashion. Based on your experiences, what are some of the things that you'd point to in that process that work well and how people should approach it, and maybe any ideas you would have about how to facilitate additional opportunities for sharing?

MR. KNAPP: The things that are a little easier are some of the things that we've done before and we know about. So geographic sharing, for example, is pretty straightforward. Time sharing gets to be a

little bit more problematic because there's a trust issue. You know, if somebody has critical safety or defense needs and they need to be sure they're going to get on whenever they need it, there's always a concern that if we allow somebody else in, is that really going to happen? And so, I think that's an issue to be examined as we go forward.

The issues relative to dynamic spectrum access as well; and we've had some experience, it's still very early in the process. And I think before agencies, including I think the incumbents on our side, are willing to accept the viability of some of these things. There needs to be confidence building and testing and so forth. And that's where the R&D piece comes in and is so critical. People need to be convinced that it actually is going to work. And I think what I've seen is both the federal agencies and the non-federal are approaching it with a positive attitude, but also that there's a lot of work

that needs to be done.

CO-CHAIR TRAMONT: On the geographic sharing part where you said there's been more success, is there a sense of scale? Has that become more prevalent in recent years, or is there any sort of trend line? Is there a certain process that has worked most effectively to facilitate geographic sharing?

MR. KNAPP: I don't know that there is a trend line. What I do know is that it's pretty straightforward where, for example, we'll have a federal operation and then we want to use that same spectrum in a different location. The engineers I think from both sides are pretty good about -- we cranked through the propagation requirements and the protection levels that are needed. So, I think that works pretty well.

MR. WEISER: Juli's being modest. He's talking over his own --

MR. KNAPP: Over what?

MR. WEISER: This is for you,

Juli, all your government service.

MR. KNAPP: Just let me know when I should duck.

Marty?

MR. COOPER: Juli, is there a mechanism in the Broadband Plan that requires recipients of this reallocated spectrum to use the spectrum in the most efficient manner?

MR. KNAPP: First of all, improving spectrum efficiency is a core goal, I think, of the overall plan. What I can say is the ways the commission has approached this in the past where we've had auctions, there are incentive mechanisms, if you spent money for the spectrum, to be efficient. And as we look to the next generation of technologies, whether it's LTE or WiMAX and so forth, they all have the hooks in them, for example, for smart antennas and so forth. Where in the past; and I don't think we've done this in awhile, we've tried to do things like define bits per hertz per unit area, that's always

been difficult to do. And I think, you know, your point is a fair one. How do you make sure that all of the services are using their spectrum efficiently, and I think that's going to be an area of focus ongoing as we progress.

Yes?

MR. REASER: Juli, if you'd go back to that slide, it shows this growth thing. That's a little bit interesting. And then it goes back to this question of efficiency. Because obviously we're not --

MR. KNAPP: Which one?

MR. REASER: That one there. That's a good one. We're not obviously incentivizing anything about being efficient. We're allowing everything to be unconstrained and eventually you will run out of hertz to actually do anything. So, it seems to me like any efforts to promote efficiency aren't really going -- we're allowing things to go unbounded in some ways. Like what kind of incentives or what kind of regulation are we

putting in place to make sure I don't have 4 billion apps on my iPhone that operate simultaneously in the background when I don't even use them, things like that? Because there's a lot of things that go on in everyday life that happen in the background that require incredible amounts of resources which actually provide no value to anybody, except possibly the person that you're paying to provide them.

MR. KNAPP: I wouldn't agree that it's unbounded. First of all, in my experience an incumbent service always feels that they're using the spectrum efficiently and the others aren't. The real challenge here is we want to accommodate all these things and not tell users, well, you can't use these apps or those apps because there's not enough spectrum. You know, I think as we look at the different services, whether on the app side you could make the apps more efficient, I don't think is a question that really has

come up relative to how that translates to spectrum utilization. But on the RF side, what I see is that there's a lot of motivation for trying to squeeze every bit out that you can.

MR. DONOVAN: Juli, just in general, I mean for years, and even when I was there, the concept of auctioning spectrum, there's been an assumption that in the marketplace when an entity purchased spectrum at auction it would be the market itself would drive it towards efficiencies.

MR. KNAPP: Yes.

MR. DONOVAN: There's always been this residual question of warehousing in the background, but, you know, essentially it's been a market-driven process. Are we saying then now that apart from simply just getting spectrum at an auction there's also going to be sort of this continuing oversight to make sure the entity that has purchased spectrum at auction will use that spectrum efficiently?

I mean, how do those two theories meld?

MR. KNAPP: Yes, I do think there's going to be continuing oversight. One of the things that the commission has tried to do, the way we've tried to get at that in the past has been the build-out requirements.

MR. DONOVAN: Correct.

MR. KNAPP: And, you know, you want to get service out there. At what point does that make sense economically as well? So, I think that's one of the areas that we continue to examine as we go forward.

As far as, you know, the efficiency of the use, I'm pretty well convinced that the bands like the cellular bands and the PCS bands are pretty heavily used. I think we all know; we're all using them. Can they continue to grow? I know that looking at what the carriers are doing, they continue to introduce technologies to try and make it more efficient.

As far as bands that were

auctioned but not built yet and the issue of warehousing spectrum, I think that comes back to the build-out requirements.

MR. DONOVAN: So, it's not sort of an ongoing second check at the market to say, well, you're putting in this technology but we think you could improve the efficiencies if you use something else? You're still going to rely on the marketplace for the efficiency aspect?

MR. KNAPP: I think the marketplace is going to continue to play a major role in this. I don't see us going back to the day of micromanaging the technology.

MR. DONOVAN: Fair enough. Thank you.

MR. KNAPP: Gerry?

MR. SALEMME: Yes, thanks, Juli. I want to kind of approach this from a little different perspective, because I think that we're all looking for spectrum efficiency, optimizing the bit throughput and, you know,

taking off my current hat and looking at it from a different perspective, because I would be in the position of wanting to maximize bits as possible and spectrum efficiency. I think that in the pre-auctions it was always a concept of highest and best use which said there were some social benefits. Even though, for instance, satellite spectrum may not be the most efficient use, it reached an area of the country or provided certain services that weren't being provided by basic terrestrial services. I'm not doing this for Jennifer, though she did let me borrow her pen, in full disclosure.

You know, and it's the same thing with microwave. I know in past practices there was an effort to reallocate spectrum away from microwave services. I think the PCS band, if I remember right, was taking spectrum away from providers of microwave services. And now we're recognizing that wireless microwave may be an important element of

building an efficient network and important for other issues. I'm a little bit concerned, but I think one of the things we just have to be wary of is to just always look at throughput bits, what's maximizing efficiency, and not going back to almost this pre-auction concept that there are a balance of uses. And in some cases a certain amount of spectrum has to be reserved for practices and services that are really at core either to these networks or for other social purposes.

MR. KNAPP: I don't think there was a question there.

MR. SALEMME: No.

MR. KNAPP: I do agree with --

MR. SALEMME: Welcome to the CSMAC.

MR. KNAPP: Thank you, Gerry.

Gary and then Bob?

MR. EPSTEIN: Thanks, Juli. You know, I've thought about this issue for, you know, a long time, as everybody else in this

room has, and I always thought there were like three concepts that we tend to mush together a little bit. The first concept is, you know, allocation of spectrum. What is the spectrum used for? You know, is it satellite spectrum, is it terrestrial spectrum?

The second mechanism was rules. Okay. You have specific rules for the use of the spectrum, and that is are they efficient? And that's where your efficiency and potentially your use of bits come through.

And the third thing that you do is you have to figure who gets it and the licensing. And the commission used to have to have, as Gerry says, comparative hearings and then there were wonderful lotteries for awhile, and then ultimately, you know, the commission or the U.S. Government hasn't figured out a better way to do this other than auctions.

And we tend to mush those things together I think, and I don't know whether

it's helpful or not to try to think about the decision making in the spectrum area that way. And maybe you could get the twin goals of potentially efficiency and utilization. In other words, just because you bought the spectrum in an auction doesn't really mean that you have complete unfettered use of the spectrum.

MR. KNAPP: Right. I mean, just in response to the last two points, I think it's fair to say we need a diverse array of services and I don't believe that we're headed down a track of just purely based on the economic value. There's a mix today and I expect there will be a continued mix between some spectrum that, for example, is private mobile, some spectrum that is point-to-point microwave, some spectrum that is satellite; because they each meet different areas of needs, and how we blend this in a way -- I think one of the challenges in evaluating spectrum efficiency is just that, is that if

you try to do just bits per hertz, it doesn't tell you the whole story.

MR. GURSS: Yes, just quickly to follow up on your comment and Gerry's. I used to practice law in a firm where I was a telecom lawyer and most of my colleagues were real estate lawyers, and they always asked me, well, what do you do, and I described it as zoning the airwaves. And I think it's a good analogy because we zone land and airwaves, you know, with the intent that there are certain things like parks and schools and police departments that we want to set aside land for. You know, I know there are cities in the Southwest where we have no zoning and, you know, they're not very nice places. And so, you know, we want to be careful of that.

But I guess the question in that is, and it's certainly something in public safety we always have to deal with, is how do we encourage the efficiency that we want in those areas where there's not the economic

incentives, the federal spectrum, the various pieces of FCC spectrum where there's not a revenue generation out of it that leads to the economic incentives? That's I think a harder thing to deal with than just, you know, auctioning them and assume people will make the best use for economic reasons.

MR. KNAPP: I think one of the challenges is is it's gotten harder, not easier, because in the past we might take a service that covered an area -- and let's say we had two services covering the same area, one we could say with so many bits per hertz per area and another, and we compared them. Now we have other factors like, well, how many cell sites are there? Are you using smart antennas or not? So, I think it is a challenge as we go forward to try and figure out, well, when we efficient, what is efficient? We've tried things in the past; narrowbanding comes to mind, that have been a challenge and haven't always been as well

received. And I do think that's something as we go forward we're going to have to try to figure out. How do we define efficiency aside from, you know, that we say this spectrum is being used efficiency versus not?

MR. GURSS: Yes, and then what is efficient means different things.

MR. KNAPP: Yes.

MR. GURSS: I mean, you know, you don't want -- the fire department, the trucks just sit there. It's not very efficient.

MR. KNAPP: Right.

MR. GURSS: But you kind of like that.

MR. KNAPP: Right. Jennifer had her hand up, then I'll get to you, Mike.

MS. WARREN: And talking about markets, I hear you speak about secondary markets and looking at expanding the list, if you like, of bands or FCC licensees that could engage in that.

MR. KNAPP: Right.

MS. WARREN: I was wondering if that would fall under triennial or that's not really something that is part of what's near term for you all?

MR. KNAPP: It is a part. At the point that the Plan went out, I think what we said in there is that we would be taking a look at how effective our secondary markets policy has been. So, some of the folks back at the commission right now are looking at this more closely to decide what steps if any are the next things we should do. Should we modify the secondary markets rules in some way? Should we expand it to other bands? It's absolutely part of our thinking, but I don't think we were quite far enough along in the process to know exactly what we might do.

Michael?

MR. CALABRESE: Yes, Juli, the National Broadband Plan, at least the way we interpret it, you know, as far as spectrum policy, the real emphasis is very short term;

one to four years, and whereas, you know, the items that pertain -- you know, in other words pushing spectrum out in reaction to today's business models and not really looking ahead, that those business models aren't going to be able to meet the nation's need for pervasive connectivity in 10 years from now. And the items that are more longer term are very vague and de-emphasized.

And, you know, I think what we've heard for example from Larry at the outset here is that NTIA seems to be increasingly and more vocally committed to more, you know, spectrum sharing and new technologies. And I'm wondering if you feel from the National Broadband Plan or otherwise that you have a mandate to actually be pursuing those sort of more longer term approaches. I mean, I know you mentioned that there's a couple in the hopper that kind of are putting a toe in the water, but are we really going to be able to move fast enough on sort of dynamic spectrum

sharing and getting access to, you know, what's really 80 percent of the available bandwidth rather than just the 20 percent that would meet today's business models?

MR. KNAPP: Michael, you know, because of the text in the item, it conveyed and impression that we're more focused on the specific short term. That wasn't the intent. I think we're in lockstep with the federal side as far as examination of the new techniques and the technologies. We both have big challenges ahead, because the federal agencies aren't sitting there saying, gee, we're locked into our spectrum forever. We're not going to have any more needs either. So, they've got a challenge just as well as the non-federal side in figuring out, well, how are we going to squeeze more capacity out of this?

For the long term planning, I think absolutely. That's why I talked about this statement. And it seemed like it was

buried, it gets lost in all of the focus on these near-term specific projects, but it's there. And I think there's a commitment both on the part of the commission and NTIA and the federal agencies to address this whether we talk about near, mid or long-term needs. We recognize we're going to have to be able to get a process in place that works to do that.

Yes, Darrin?

MR. MYLET: Relative to a fact-based data-driven policy making, going back to decisions on assumptions that the commercial carriers are using spectrum; just using it, I'm not saying using it efficiently, but just fundamentally using it across multiple jurisdictions whether it be, you know, urban areas, suburban areas or rural areas, I mean, do you see that we might move towards requiring commercial carriers to disclose how they're using their spectrum at a tower level, at a height level, at a power level? Or would you like to see or do you see that spectrum

measurements could actually give you the data that would allow you to analyze if there's a merger or an acquisition, how that might effect the use of the spectrum by those two entities?

MR. KNAPP: That's a rich question there. There's a lot of topics in there.

First of all, I think both the goal of our transparency process is to make more information known about spectrum and its use. The pending legislation also has that as, more than goal, a requirement for the federal and non-federal agencies to gather information so that it is understood. I don't know that that goes down necessarily to the tower level. I don't necessarily have to know where every tower is to understand whether the spectrum's being used.

The other thing you brought up is the spectrum measurements, which was also in here, and it is a challenge. Because I think what people want to is, all right, you're

showing me what the zoning map looks like, you're showing me who you've granted building permits for, but now tell me what's been built and if it's being used. And it's something that is important to do, but it's not as easy as it sounds because of the diversity of the services out there. You really have to understand how to make these measurements to be in the right place and so forth, which is not to say it shouldn't be done. It's just that if you're an incumbent service, you want to understand that this is being done correctly so that things aren't missed.

CO-CHAIR TRAMONT: Let's do one more question and then we need to wrap up.

MR. KNAPP: I needed a longer presentation, clearly.

Go ahead, Mark.

MR. CROSBY: Juli, is it safe to assume that the spectrum dashboard is also sort of like a beta initiative for spectrum inventory?

MR. KNAPP: The question was is the spectrum dashboard a beta for the spectrum inventory? I don't want to link the dashboard necessarily with what comes out of the legislation. The legislation, if it passes, is going to have very specific things it wants the commission to do. I think this was something on our own. Just hearing from people that there was a need to have a better understanding of the usage was something that we felt we needed to do and it was our first crack at it.

MR. DONOVAN: Thank you, Juli. Just to add onto what Darrin said, given the complexities involved and actually looking at actual usage, but also given the importance of the issue, do you anticipate that the commission will move forward with parts of that Broadband Plan, whether it's reallocation or we're using various bands of that spectrum, prior to conducting a full spectrum inventory of the type envisioned by congress?

MR. KNAPP: When we laid out the specific steps that the commission it would take --

MR. DONOVAN: Right.

MR. KNAPP: -- I think we're still committed to that plan.

MR. DONOVAN: Okay. Thank you.

MR. KNAPP: You know, obviously whatever congress may direct the commission to do is what we'll follow.

MR. DONOVAN: Okay. Thank you.

CO-CHAIR HATFIELD: Juli, you have another commitment though, don't you?

MR. KNAPP: Seriously, I have a 10:00 meeting on the open Internet, but I have somebody pinch hitting on the chairing for me.

CO-CHAIR HATFIELD: All right, Marty, wrap us up.

MR. COOPER: Juli, first of all, I really appreciate your presentation, because you really gave me a whole new perspective on what the Broadband Plan is. So, I want to ask

a non-question, really make a suggestion.

When I look at the history of what happened in LAN mobile, which is the only thing I know anything about, I think about what happened with cellular at the beginning. People talked 30 minutes a month and then they found out the value of being able to talk mobilely, and now we talk 3,000 minutes. That's 100 times. The same thing is going to happen with data. So, it's clear that adding 100 megahertz to the 250 that exists now is not going to solve the problem. And I think you know that and that's why you talked about R&D.

MR. KNAPP: Yes.

MR. COOPER: And I only want to suggest that there be more emphasis in the R&D area. There are in fact spectrally-efficient ways of using LAN mobile spectrum, and I realize it's a very narrow area, that exists in the field today in other countries and other systems. I don't believe; that's the

only thing you said that I don't believe that are existing, people are using the most spectrally-efficient techniques now, because they're not motivated to do that.

MR. KNAPP: Yes.

MR. COOPER: So, I would urge you in this broadband process to put a little more emphasis on R&D and more spectrally-efficient techniques.

CO-CHAIR TRAMONT: Thank you, Marty. And thank you, Juli, very much for your time this morning speaking to us and we appreciate it very much.

MR. KNAPP: Sure. Thank all of you.

(Applause.)

CO-CHAIR TRAMONT: And thank you for your tremendous service over the years to the leadership on these issues.

With that, we are going to move onto RADAR 101. There had been a conversation over the course of the last few meetings about

the role of RADARs and the way they use spectrum. And there is a groundswell of interest among committee members in better understanding RADAR technologies and getting a better sense of how the spectral resources were utilized for the RADAR. So, we tapped into the expertise on the CSMAC itself, and Mr. Weiser has agreed to provide us with an overview of some of these issues. There may well be a deeper dive in some of the subcommittees related to these issues, but we thought it was worthwhile to spend some time as a full group with an overview of the RADAR issues.

And with that, I will turn it over to Rick, and who is getting his deck ready.

DR. ROSSTON: Is there a way to see the decks for people on the phone?

MS. WARREN: Yes, the Webcast, apparently.

CO-CHAIR HATFIELD: If you could turn into the Webcast, then it'll be focused

on the screen.

DR. ROSSTON: Is there a link or something? I don't know if I got that information. So, could you provide that for me right now?

CO-CHAIR HATFIELD: If you got NTIA's main Web page, www.ntia.doc.gov, the link is on our main page.

DR. ROSSTON: Okay. Thank you.

CO-CHAIR TRAMONT: But there's, you know, thousands of people around the country who are tuning in, so it may be hard to get on. My family at home, for example. Nothing says party like a little CSMAC online.

Okay. We're ready to go. Rick?

MR. REASER: Well, now that Gerry or Julie has taken up all my time, I think I only have 17 slides. But now for something completely new, I think it's going to be RADAR .101. I'm not sure how long you want me to talk. I have 17 slides. I don't know if you want me to -- okay. All right.

This is really something different. The word "RADAR" appears three times in the National Broadband Plan, and it's in the context of sharing with RADAR under DFS and also about providing full-motion video of RADAR weather imagery, which is what it's talking about. So, this is something that's probably quite a bit different.

And what I want to do is talk about some of the spectrum issues, a little bit about RADAR. I was going to show a bunch of equations and get a RADAR range equation and how do we image processing and all that stuff, but I'm not going to do that. I'm going to talk about much more basic stuff.

So, basically I'm going to talk about what is RADAR? How is it different? How does it work? What frequency are we talking about? How's it used? How's it regulated? What are some of the trends? Because just like we see this growing, you know, exponential need for spectrum to do

things that the National Broadband Plan is concerned with, I think you're going to see that in just about every service. And the question I was trying to poke at with Juli was, you know, is that really something we want to do maybe for all services? Do we want to allow unconstrained growth? Because eventually you are going to run out of spectrum and you might run out of RADAR spectrum as well.

So, RADAR is an acronym, and I'm sure you know, back in World War II is kind of where the Navy came up with this thing RADAR, radio detection and ranging. And that was sort of the original context of RADAR. The RADAR has actually gone far beyond what it originally did back in World War II. In World War II they were trying to answer the questions are the Germans coming, and especially in terms of bombing the U.K.. And where are they now? So, where are the planes? Where are they at right now? How long do I

have to react, to do something? Do I send people to bomb shelters? Do I send out the fires to go get them, you know? And how long do I have to deal with that?

And then we got into things later as we found out more and more about what could be done with RADAR. I can actually tell what things look like. I can take pictures of things with RADAR. I can tell what things are made of by RADAR by using some of the different kinds of things that RADAR offers to us as we've sort of gotten more and more sophisticated than complex in the way we are able to do things with RADAR. So, that's kind of what RADAR is.

So, I want to talk a little bit about in the world of spectrum speak, because most of you deal with a world of spectrum. And so, RADAR has its own specific particular language that it uses within the world of spectrum. And so, in the ITU and in the FCC rules and NTIA rules, RADAR is basically

talked about as being a radiodetermination system that compares a reference signal with radio signals that are reflected or retransmitted; and we'll talk about the difference between the two, from a position to be determined.

So, in the original context of RADAR it was to do radiodetermination. So it had primarily two kinds of RADAR, primary RADAR, which is one where I send a signal out, it bounces off something and I look at what is returned back; and then secondary RADAR, which is one that's like a transponded RADAR, where a signal goes out, a receiver receives it, then sends something back, you know, with another transmitter. So, there are two types of RADAR in the world of spectrum.

So, then you ask, well, what's a radiodetermination system? Of course, the way this works is it's a giant tree of things in terms of RADAR speak, and if you go through the ITU rules and the FCC rules, there's a

whole family of different kinds of radiodetermination. Two basic families. One is radionavigation. Those are RADARs that are used to navigate and for obstruction warnings so you don't crash into things. And so, they have a whole bunch of services; and these are the kind of things you see on the NTIA chart and in the ITU rules, the Aeronautical Radionavigation Service and so forth, Maritime Radionavigation, used primarily for navigation. And on the other side you have radiolocation, which are primarily things that -- it's everything else. And so, radiolocation is basically everything else. It could include things like weather RADARs and possibly imaging RADARs and so forth, and a whole bunch of different families.

So, when you get into the world of spectrum, we have specific language that we use. And you notice the word "RADAR" I think appears like once or twice within the ITU rules or within the FCC rules and we use these

other words. So, don't get confused if you don't see the word "RADAR" too often in terms of the world of spectrum, because it has its own language.

Now, RADAR is really fundamentally different than most other radio services that we have. Most radio services like the ones you have, like your BlackBerry, your cell phone, they're used to actually communicate information and transfer information back and forth. And RADAR uses actually a different whole series of principles. RADAR is essentially sensors used to collect information or gather information. It doesn't really communicate information at all. It communicates information to an operator or to some person after they do something with the signals it processes. And then that's another series and we use regular communications to do that.

The other things that makes RADAR a lot different than other kinds of systems,

although broadcasting systems are similar to this, it has very, very high-powered transmitters and uses very, very sensitive receivers. So, that's because when you think about it we send a signal out and the reflected return is very, very weak, so I have to have a fairly sensitive receiver and usually a very sophisticated processing and receiving techniques to try to figure out what that signal is that I'm receiving. So, that means that RADAR doesn't necessarily share very well with other services.

Now, there are some exceptions to that and there are some ways that RADAR can share. But in a general sense, to a radio, RADAR just sounds like noise. It's a horrible thing. And it's fairly high-powered, because if you get close to one, you know, you can kind of cook yourself even. But it will also cook your receiver. So, typically RADAR doesn't share well, although that's not always true. There's probably some ways to do that.

The other thing that's important to remember is RADAR generally isn't a consumer item. Now, some of you have microwave ovens. That's kind of RADAR, but those operate on different RADAR bands than regular RADAR and it uses RADAR techniques. Some cars have RADARs now, and there might be RADAR in the future when we get intelligent highways, but essentially it's not really consumerized. So, it's something that's sort of off the RADAR in terms of a normal everybody's, you know, kind of thing. You know, you have your cell phone, you have your TV set, those of you who still use broadband TV, and those kinds of things, but you don't really have your -- you know, you don't pack up the family RADAR and go on a camping trip. That doesn't really happen too much.

Now, the thing that RADAR does have in common with other services is, just like everybody else, it needs more spectrum. And basically, it needs more bandwidth to

provide it more benefit, just like you need more bandwidth to be able to do full-motion video while you're driving; you know, of which I'm not sure why we allow these things to happen, but we need more bandwidth to make RADAR operate the way it wants to.

So, how does RADAR work? And as I said, my guys put together these slides with all these equations and all that kind of stuff, and a range equation and false targets, and I thought that was just -- you know, I have 17 slides here. But RADAR is a lot like shining a flashlight at something. When you shine a flashlight at something, the light's reflected back to your eyeball or to your sensor and you see the object, right? And that's typically how most objects like an airplane or a ship or a person even, they'll reflect radio waves just like they do light. It's just a different frequency. Light is much higher frequency. RADAR operates at a lower frequency.

And one of the things that's interesting about RADAR, some of the frequencies RADAR uses, and RADAR uses a lot of frequencies, have very special properties that allow you to do certain special things that you can't do with a normal flashlight. And some examples are this: You know, RADAR or radio waves are essentially -- the atmosphere is sort of transparent to them. So, you can actually look through things like clouds and see the thing being reflected back through the cloud. You can see through a cloud, or see through fog and see through all sorts of kinds of things that you normally couldn't see with a flashlight.

The other thing is that some RADARs -- and we know a lot about this, Julie and I know a lot about this from when we were doing the ultrawideband proceeding. But some RADARs actually see through objects, like solid objects. And we talk about ground-penetrating RADARs, and see-through-the-wall

RADARs. But that's sort of a fascinating property of radio waves, that you can actually see through objects. And there a lot of other things you can do with RADARs that have special frequencies or special things. Like you do with HF, you know, RADARs can be made to bounce off the ionosphere and bounce around and do different things and do some very clever things to allow you to sense and get information about something you normally wouldn't have access to for a variety of purposes. You know, for weather purposes, for traffic control, for military purposes, many different kinds of purposes. So, there are some special things about how RADAR works.

The basic idea, and the original RADARs were pulse RADARs where you sent out a pulse, it hits something, comes back and then by calculating the time it took for the signal to go and bounce back I could tell things like that something was there and then maybe how far away it was. And then as we got more

sophisticated, we could actually do a whole bunch of other things like tell maybe what it was made of even. Is it metal? Is it made out of rock? Was is it? We could tell how fast it was moving. We could tell lots of different kinds of pieces of information, even take a picture of it in some cases. So basically that's the basic principle.

And as RADAR became more sophisticated, what we would do is we'd add modulation to these pulses so we could distinguish them from other pulses. Because if you think about it, the RADAR receiver is kind of wide open. It's listening to everything. You know, if it's wide enough, including your cell phone and your broadcast radio and any kind of out-of-band emissions that are going to get into that receiver. So, it has to be able to distinguish all these different things to find the return that it's really looking for. So, we do clever things with modulating these pulses and adding

different kinds of pulse characteristics so we can distinguish things and also pull out different kinds of information about what goes on with RADAR. So, that's the basis idea of how it works.

RADAR design, and the reason why you don't see RADARs operating at a single frequency is a whole series of tradeoffs of things that you have to consider, and most of them are frequency-dependent. And so, they have to do with, you know, the lower the frequency, all these things happens and the higher the frequency, all these things happen. And remember, we have RADARs on all sorts of different kinds of things.

We put them in your bumper, right? And so, you know, if you want to have a little tiny RADAR, it's probably going to have a much higher frequency and maybe a lot shorter range, like if you're backing in; because some cars have little RADARs in their bumpers and so forth.

If you want to see something a long, long ways a way, you see these huge installations of gigantic RADAR antennas that look for ballistic missiles or incoming aircraft or those kinds of things, and they're big RADARs that take a lot of power and they're very long range and have different kinds of characteristics.

If you want to put a RADAR on an airplane; and we put RADAR on all kinds of airplanes, on all sorts of airplanes including civil aviation airplanes, those are going be generally smaller at a higher frequency because I can't fit all that stuff on an airplane and I'm just going to generally operate at a higher frequency. So, there's a whole wide range of tradeoffs that go into achieving what you want to do in a RADAR, most of them based on frequency.

So, what that means is there are radiolocation allocations all over the spectrum, you know, all the way down to low.

And this is sort of just a table we put together for a different reason, but you can see that there's places that RADAR happens either in a primary or secondary allocation all over the spectrum. And there's reasons for that, and it goes back to the other chart. Because to achieve certain kinds of benefits of RADAR, I have to use different frequencies just because of the physics, size constraints, power constraints and other kinds of things.

The other thing you could take off this slide is a similar problem that you have in just wireless. You'll notice that there are very few solid bars, or everything's all the way to the same color the whole way. So, you have basically the U.S. obviously up at the top and then all the different regions of the world. And they're all doing different things when it comes to RADAR, just like they're doing with regular cellular communications and your cell phone and everything else. So, there's real no harmony

anywhere in it. So, RADAR has exactly the same kinds of problems that we have with just wireless communications. So in that respect, RADAR is very much the same as everybody else. But you can see that there's no real harmony here, and it also operates just about every frequency band there.

So, let me talk about in a couple slides going through what the various frequencies do and what the uses are for RADARs across the various bands. And so, we go all the way down to the very low frequencies and those are typically your over-the-horizon backscatter RADARs. And those are like HF RADARs and basically you take a RADAR, bounce it off the ionosphere and look at a target, it bounces back and see where things are going and see things out there.

We also use it for ionospheric sounding itself. So, we use RADAR kinds of systems to determine how high up, you know, the ionosphere is and so forth, and for

different kinds of measurements in terms of weather and those kinds of things.

Then the next band is the VHF band. Lots of different things. Long-range surveillance is one of the primary things we do with that band, and space tracking. The current space tracking operates in this band. A lot of environmental monitoring goes on. And foliage penetration works very well at this band. If you want to see through things, this is a great band to see through trees and foliage and so forth to find out what's going on in there in terms of, you know, border protection or defense purposes and so forth.

UHF RADAR is another common band we use. That's also used for long-range surveillance in submarine launch, ballistic missile detection. We use it for space to track things in space. Airborne. A lot of your airborne early warning RADARs and stuff like. The Navy and the Air Force use that particular band because it's a fairly long-

range band and you can see airplanes a long ways a way and what's going on.

L-band is another frequency band we use. Primarily air traffic control and air defense-kinds of RADARs. Missile tracking is also done in this band.

S-band, lot of maritime RADARs in this thing. This is also where a lot of your wall penetration RADARs are, in terms like fire departments, you know, when buildings cave in and stuff like that, or maybe law enforcement wants to see through walls and so forth. That's a lot of work goes in there. We do some space things in there, but primarily maritime RADARs are used in that band.

Missile tracking is used in the C-band. Lot of discussion. This is where some of the DFS stuff came into play about sharing some of those bands with wireless LANs. Fire control RADARs operate in this band.

A very, very common popular kind

of band is the X-band RADAR, which is probably one of the most highly populated and highly subscribed RADAR bands, and that's typically 8.5 to 10.5 gigahertz. Also, there's a radionavigation band in there, 9.0 to 9.2, and that's used for a wide variety of things, because that's the band that fits best on airplanes, because it's small, low-power and small antennas and so forth. So, lots of things going on in this band. And that's where we start to see some of the advanced applications like synthetic aperture RADAR, which is used to take pictures of things. So, we use this band to actually take RADAR images of various things off of maritime aircraft and fighter aircraft and so forth. Lot of precision at location, lot of other maritime uses are using this band. It's one of the most popular aeronautical bands for RADAR.

Ku-band is also a popular aeronautical band used primarily for imaging, synthetic aperture RADAR and also ground

moving target indicators, so you can see things moving on the ground, like ships and tanks and people and things like that.

The next band is Ka-band. That's starting to take on a lot more application. Obviously a smaller wavelength and a higher frequency. And where a lot of missile seekers operate in terms of missile things. Autonomous landing systems are done in this band.

And then up in the V and W-bands, we're starting to get a lot more. Obviously, it's a little shorter range, but we're using that for missile tracking as well, a lot of imaging things.

And then you probably have heard, we have things that are like 94 gigahertz where you can use it for like riot control and crowd control, where it actually causes a RADAR technique used to cause people to feel uncomfortable so that they leave the area when you do that. There are some automotive

applications.

My company did a project. You can read about it in the paper about it. But it was an interesting thing about riot control, for crowd dispersal.

Then there are some automotive applications like there's talk of using it for sensing so that when you back up you don't hit things and so forth. So, lot's of things.

Now, since many of you are regulators or former regulators, I think an important thing to talk about is we don't allow RADAR to just go unfettered. It operates under the same kinds of rules and regulations that any other radio service does. And the principal way to regulate RADAR, which is different than other things, is through something called RADAR Spectrum Engineering Criteria. And these rules or these criteria are based on the ITU out of this SM-1541-2, which has to do with out-of-band things.

Because essentially, if you think

about it, as I mentioned, RADAR is typically a very high-powered device, which means the higher the power and depending on what you do with the modulation, the bigger the sidebands or the bigger the sidelobes are going to be. So, RADAR has a special set of rules it operates under which are different than normal rules about how things operate in and out of bands. And this has to do with, you know, the whole issue of sharing with RADAR.

So, it has this thing RSEC, which is sort of a relaxation of the conventional band limits, and I'll show you how that works. And basically what that does, it balances the trade between adjacent band services and then the fact that RADAR does actually have to work to be useful. And so, we watch that very carefully in the NTIA. We turn in these things called LCID now; which someday we need to talk to Carl about all the problems in LCID with RADAR since it doesn't deal with phase-coded RADARs at all, even Version 6. But

basically what happens is we do regulate RADAR to make sure that it doesn't have problems with adjacent band services to the level within the rules. And if you don't do that, then you can't turn your RADAR on in other countries. In fact, you can't turn it on in this country either.

So basically what we have is these curves and there's different criteria. And I think Ed drew these curves right back in the days of the slide rule. And so we have different criteria, but basically I just wanted to let everybody know that, yes, RADAR's regulated just like everything else. So, we have a whole series of things we got to do and we got to fit within these curves, depending on what kind of RADAR it is and it's a real pain, just like it is getting your products certified. Getting a RADAR certified is equally obnoxious at times, but a good thing because we all want to be good stewards of spectrum and share appropriately. So, this

is sort of the sharing criteria.

The thing to remember though is, since this is all kind of relative, if you're next to a RADAR there's going to be some spillage underneath this curve obviously, but there's going to be some things to deal with.

So, where is RADAR going? Well, we saw from Juli's chart that basically the need for broadband communications is traveling unbounded exponentially. I was trying to plot out where we're going to be in 2014.1, and I think we're going to be up at the 100 gigahertz level in terms of needs. But we have the same kind of issues here in the world of RADAR, because there's lot of trends going on in terms of what we're doing.

One of the things that's going on is we're building multi-function systems. What that means is we used to build like a RADAR that would just sort of detect if something was out there and maybe track it. And then we'd build another RADAR to be able

to launch a missile at it. We'd build another RADAR on the same airplane that would do the weather, because we had to see where the clouds were so we could fly around them, where the storm cells were and so forth. And then we'd build another RADAR to take pictures of the ground so we could see where it was going. Another RADAR to take a look how far we were from the ground in terms of an altimeter kind of a thing. Well, those are going now into multi-function systems where I basically have one RADAR do all these things, right? Using all the different techniques, processing power, different frequency bands and so forth to do that out of one box. That means we got to operate across more bands and have more spectrum access.

We also want to take better pictures were RADARs because we want to be able to see through clouds, we want to be able to see what's going on with respect to the weather. And so, that means we need to have

wider instantaneous bandwidths, you know, in terms of what we do. We want to detect smaller targets at a long range with more power. We want to be able to operate through foliage and things like that and see through those. That means lower frequencies, as I sort of talked about earlier.

And then we want to be able to put little tiny, tiny RADARs on little tiny little airplanes to fly around and do things. There's a whole process now you probably read or heard about with NOAA and so forth. And NEXRAD is the -- WSR-88 is our weather system that does all the nice weather cloud pictures you see. Well, that was put in, you know, like back in the '80s. Thing's getting frightfully old, so you're saying well let me replace these big huge RADARs with a bunch of smaller RADARs and change the frequency and so forth. So, there's lots of work going on with that. In terms of air traffic control there's been lots of ideas about how that goes.

So basically RADAR does a lot of really important things and it needs more spectrum just like everybody else.

So, let me just sort of summarize. RADAR is sort of fundamentally different than most radio services. It's probably more similar to radioastronomy than it is to other things, although radioastronomy does try to communicate with people from other planets I'm told, but it does some communication. But RADAR is different.

It's used to collect rather than communicate. It doesn't really share well with other services. There are some exceptions to that. Systems that can handle pulse interference typically can share well with RADAR, and that's why GPS shares reasonable well with RADAR.

It supports a wide variety of missions: Aviation, defense, public safety, environmental things in terms of weather monitoring and natural resource-kinds of

things.

It's not a consumer good, like I said, so it's really off people's RADAR, and it's typically the domain of governments and typically that's because it's done for the good of everybody. It's not really something that individual consumers deal with, so that's why you don't see the word "RADAR" except three times in the National Broadband Plan. It's not something that people are typically concerned. But they do actually use it everyday. I mean, I used RADAR a whole bunch of times as I was flying here from LA to Washington last night. And thank God I did, because I'm here in one piece, a little bit tired, but I'm here in one piece.

And then of course the last thing is RADAR has a diverse and growing set of spectrum uses just like everybody else, every other radio service. And I want you sort of understand that you can see the great tension there is between the radio services. And

there's more things to worry about than just whether I can get 4 billion apps on my iPhone. So, I also want to be able to do RADAR as well.

So with that, that's a very sort of top-level view of RADAR. I have backup slides. If you want to get into the range equation, if you want to figure out about image resolution, we can get into that.

CO-CHAIR TRAMONT: David Donovan wants to talk about that with you privately afterwards.

MR. REASER: Okay. We can do that.

MR. DONOVAN: Being to speak publicly.

MR. REASER: So, if you have any questions or comments, that concludes my -- yes.

MR. COOPER: Is there a category of RADAR that has an opportunity for reallocation; namely, for identifying objects

as an example? And RADAR's got to be extraordinarily inefficient, right, because you're lighting up the world and you're only looking for one bleep? And today you can use GPS for that and get a much more precise picture.

MR. REASER: There are projects that do that. But remember, let's talk about 9/11. The guy turned that thing off. You know, that transponder is actually a RADAR. A secondary RADAR is what that's called. So, there's a spinning dish that sends out a signal to that airplane and then it sends something back. And that's how most cooperative targets are being used. And that's going to be replaced eventually by something called ADSB, automatic dependent surveillance broadcast system, where GPS is on every platform it sends you a location.

Remember, not everybody wants to know where they are. I'll give you two examples. My twin 17-year-olds, they don't

want me to always know where they are. I'd love to strap a GPS on those two high school seniors, but I'm going to have to you use RADAR. And I'm sorry, it's just the way it is.

But see, that works on cooperative things. And remember, a tornado or a storm or some of these other things, they aren't cooperative. They're going to happen where they happen. I'm going to need to use the frequencies that best detect that and report that back. And then I'll use my wireless system to communicate that full-motion video, just like it says in the National Broadband Plan, back to some consumer on their iPhone.

But I guess the point is depending on what the size of the target is, where it is, whether it's cooperative, what it's made out of, I need a whole wide range of frequencies to actually detect and do that. And that's sort of the unfortunate thing. In terms of the bits per hertz, there are no

bits. Most of these things are what they call PON. For those of you in the world of emission designators, they're pulse unmodulated. There's no information on that pulse at all in many, many respects, so the bits per hertz is zero.

MR. COOPER: I take it your answer is no?

MR. REASER: PON. Right. Yes, go ahead.

MR. EPSTEIN: Thanks, that was a terrific help in the presentation. It really was.

This is a transparency question. When you want more spectrum and you have more uses, what's the mechanism you use? How do you get it? Do you got to NTIA, or is there FCC proceedings? You say it's not commercial.

MR. REASER: Unfortunately, it goes back -- and Juli knows this better than anybody. It goes back to this slide. The problem is you really have to kind of go to

the ITU. And that's kind of how we deal with these kinds of things. Because first you got to go to the ITU. Remember, RADAR is long range. It doesn't go out of my one cell site to another. It goes to other countries, right? And so, we need to have some uniformity in terms of how we operate, and typically there is in a lot of RADAR bands. Not all of them, but in some of the principal ones there is.

So, one of the things that happened at one of the recent works is we tried to say, hey, listen, a RADAR is a RADAR is a license. Why can't radiolocations share with radionavigation in the 9.0 to 9.2 bands? So, that was one of the things that was done.

There are some other things in Ku-band where we're looking at how we can share better with RADAR itself, because radiodetermination or radio has its own issues of sharing, about safety services versus non-safety services. So, typically we start with

things like the ITU.

You know, most RADAR bands, if you look at the FCC chart, they're blocked bands. They're shared bands anyway, because they can be used for non-federal and federal uses. Not that many, you know, cool commercial RADAR uses now, but when we get to things like intelligent highways and so forth, you're going to see a lot more RADAR uses as sort of a tracking system in addition to things like GPS. But you're going to see a lot more things like that in the future.

MS. WARREN: Can I just add something to that?

MR. REASER: Sure.

MS. WARREN: You know, we as manufacturers, other than for experimental testing, we really don't do anything with the FCC with respect to that. It's the federal agency, whether the FAA or DoD or whomever that goes to NTIA both for support for additional allocations or specifically for

assignments for those RADARs.

MR. REASER: Yes, manufacturers don't get involved with that, realizing it's a domain of government anyway.

MR. CALABRESE: That's, Rick. That was very informative and helpful. Great overview.

Yes, my question is, you know, the military has been willing to share certain RADAR bands on I guess what you could call a passive basis; in other words, where they could just continue doing what they're doing, but through sensing and dynamic frequency selection. Some uses are able to work around them such as in the upper five gigahertz band with wi-fi backhaul and wi-fi in general.

So, I'm wondering, as these technologies become more advanced so there, as you said, is more sophisticated processing techniques, maybe better receivers, maybe directed antenna rays; I'm not sure of the combination of elements, but if a more sort of

proactive stance was taken, could the RADARs filter or program the receivers to ignore certain transmissions that they're not interested in?

MR. REASER: Yes, they do that today. There's limits to what that is, because you get into the things about what the noise floor is, because in any receiver, you know, ultimately the noise floor is going to generally -- and I mentioned there like the lower the frequency you go, unfortunately what the problem you have with the natural noise in these lower frequencies, which are really good for long-range, those are the ones where you're going to have issues with that.

Yes, there are things that can be done in terms of directivity, but it gets back into, you know, coming up with a kind of a sharing arrangement that really works for all parties. And obviously there's a lot of things that can be done. Unfortunately, it comes down to the most -- you know, we think

the spectrums are a scare resource. The biggest scarce resource is money. Now, if you had a lot of money, you could probably do incredible things in terms of sharing and technology, to have RADARs share with radioastronomy in fact. You could probably have that happen. Don't quote me on that one. But, you know, the point is given enough time and money you can do anything. The question is what's the driver and whether you're willing to invest in those kinds of things. We could do a lot more, as Mark knows, down at DSA and DFS and these kind of technologies if people were willing to expend the money to go make them happen and just turn the crank. But that's kind of what it gets down to.

The other thing is you got to realize a lot of these people, you know, you think the military's bad about hanging onto stuff, there's some FAA stuff that should just be put out of its misery that's so old in terms of RADAR technology. I mean, it's

amazing that we still have it around. But it all comes down to money. Does somebody want to go back and retrofit all the ARSR-4 -- ARSR-4 came into existence when the NEXRAD came into existence back in the early '80s. And that system is incredibly old and it's always using incredibly old technology.

But does somebody want to go back and pay to have that stuff retrofitted with modern, you know, phased array, actively scanned arrays that do incredible processing? Does somebody want to spend the money to go do that? And the question is, well, maybe that could be thrown on the table as well and say, hey, listen, if you're ready to go implement the National Broadband Plan, why don't we go fix NEXRAD, ARSR-4, JSS, all these RADAR programs that are in need of being replaced as well maybe with some new technology and so forth and modernize those as well? I mean, that's sort of the trade. The ultimate limiting resource is going to be money, and

time.

MR. CALABRESE: Goes back to the incentives.

CO-CHAIR TRAMONT: Okay. Thank you very much.

CO-CHAIR HATFIELD: Yes, Rick, that was terrific.

(Applause.)

CO-CHAIR HATFIELD: Okay. So, should we try and do the first committee report, or first couple committee reports now, or take a five-minute break now with the idea that we'll sprint through to the end if we take one now?

(No audible response.)

CO-CHAIR HATFIELD: I'm getting the one now. All right. So, let's come back at realistically 20 minutes of and we'll reconvene then and start with Mark and Jennifer's reports.

(Whereupon, at 10:35 a.m. the above-entitled matter went off the record and

resumed at 10:45 a.m.)

CO-CHAIR TRAMONT: We're back on. So, we're now going to move to the subcommittee status reports. We have two reports that are ready for adoption today, presuming that that's the will of the committee.

Recall that the final reports are adopted with editorial privileges, so there's a brief editorial period after the meeting that allow folks to do final cleanup, and then they would be published in final form on the Web site.

We then have a first draft of David Donovan's committee report on Adjacent Band and Dynamic Spectrum Access Subcommittee. And then Michael's going to update us on where we are on Incentives.

I know we have two new scope of work proposals that we want to get launched and get our two new committees fully volunteered for, sort of get our teams

together.

So, with that, let's start with Mark and Jennifer who will give us an overview of the final report from the Spectrum Inventory Subcommittee.

MR. CROSBY: Thank you. I'll say a couple things quickly and I'm going to have Jennifer and the other subcommittee members weigh in.

This was truly a collaborative effort. Can't do this without cooperation and participation and passing, which we had lot of at moments. So, Michael Calabrese, Marty Cooper, Gary Epstein, Bob Gurss, Mark McHenry, Darrin Mylet and of course Jennifer. It was excellent and it was great working with you all on this.

Since the last version in March, we received editorial assistance from Gary Salemme. Kevin Kahn, as promised during the last meeting, wrote a piece on -- he said some of the new technologies will be smart they'll

be able to monitor the spectrum usage on their own, so we added that, his suggested edits to a future consideration segment in the report.

I want to thank UTC and Prudence Parks for editorial additions regarding be careful how much information you share where water intake and utility grids and things are. So, those edits were incorporated in the document.

And Mark McHenry kept on hounding me on certain things on some incongruities on the benefits of spectrum monitoring, and we removed hopefully an remaining discrepancies in the text regarding the merits of spectrum monitoring.

We also received some substantive changes that I believe that Bryan will bring up. We looked it and we submitted it, much of them, or virtually all of them, to the subcommittee and we didn't receive feedback necessarily pro or con and given the lack of time, we opted not to incorporate that at this

time.

But I think we're in reasonably good shape with the document where we are and at this point I'd again thank everybody and have Jennifer and the other members of the subcommittee, if they're so inclined to, comment. Thank you very much.

MS. WARREN: Well, I actually don't have much more to add than what Mark said. I think this is very similar but for the changes that were identified by Mark from what was presented to the committee last time and with the enhancements made by the members' contributions.

I think that it's structured in such way that we've tried to set this up so it's very clear what our advice is, the context for it, and then the recommendations so that again it's easily extrapolated from for Larry and his team to understand. We got a lot of feedback from this committee on that, as well as members of Larry's staff. So,

hopefully this is also a good template for future reports as well.

With that, I think one last thing is we did try to reconcile where there were some inconsistencies in language that both Mark and Michael raised, and I think that's been reflected to everybody's satisfaction.

And we do have the two appendices which should be looked as well. One is an illustrative list of spectrum inventory elements and then again the potential use of spectrum measurements and how they might be useful.

And I think with that, opening it up to the subcommittee and full committee for questions and hopefully for putting it forward for adoption.

MR. CALABRESE: I would just, you know, comment that I think an important theme in the inventory report that might -- I don't know if it goes against conventional wisdom, but it's worth noting, is that we tried to

emphasize that the inventory should be designed not primarily as a means to reallocate spectrum, to redistribute spectrum rights from one party to another, which seems to be some of the assumptions about why an inventory might be being done on Capitol Hill, but that actually it's greatest utility, if it's done well and done with these metrics that we're recommending, is to provide kind of a tool for policy makers to increase spectrum efficiency and sharing. And so, that's going to be in the longer term, the greater use of this. And we should really keep that in mind in creating a richer inventory, as far as the sort of engineering metrics and so on, and not a more two-dimensional static thing that's just about redistributing rights in the short term.

CO-CHAIR TRAMONT: Now, I mean, on that score actually, so there were two concerns I have about the tone of the introduction part of it. The inventory stuff

I think we have a broad consensus. There were two elements early in the draft that I had concerns about.

One is the -- actually it's a notion just touched on. It's obviously true that one of the goals of the inventory is to identify spectrum that's underutilized, and then to respond to that with some policy response, one of which could be build-out requirements as a way to get more efficient use. One could be looking at additional technologies, facilitating additional technologies.

Another could be reallocation. And I was concerned that the draft seemed to not acknowledge the important role that reallocation has played traditionally in spectrum management. Where as demand has ebbed and flowed in different services, government has repeatedly reallocated in an effort to adapt to those needs. That's certainly how we ended up with additional CMR

spectrum. That's why the government decided that we were going to take some spectrum from broadcasters. It's how new defense systems are built. We make decisions about how to reallocate spectrum.

So, I was concerned that it didn't adequately describe the role of reallocation as a potential tool in adapting to changing environments, particularly in a world in which a lot of the spectrum management is via command and control. So, I was concerned about that.

The second thing I was concerned about is at some points it seems to suggest that a mandate of a particularly technological approach or a particular efficiency would be appropriate. And as Juli pointed out this morning, I'm not convinced that a technology mandate or an efficiency mandate is appropriate for all bands, or maybe even for any bands and I would want to be more cautious about the description of technology mandates

and efficiency mandates, to make it clear that that's one tool that might be appropriate, but that's not sort of a broad policy point, or a broad policy mandate that should be adopted by the committee.

I bring these up. I don't thing they go the core. The core of the report is about the inventory itself, and I think those recommendations are an area of wide agreement. This is sort of what the purposes of the inventory are. So, I don't view it as sort of at the core of it. It's more the tone of how the inventory results are presented.

So, those were the two concerns I had about the draft.

Gary?

MR. EPSTEIN: Yes, these edits came in kind of late and there is an amazingly respectful but wonderfully spirited series of emails that went on over the last couple of days. And ultimately I think it's almost a little bit of wordsmithing and religion, and

not with a real big difference in concept. I actually come out a little bit more on Bryan's. We're a little bit too stark I think in the report on this issue talking about reallocation being based upon flawed presumptions and things like that. So, I don't know if this is acceptable to the subcommittee, but I would vote for the report. I think the conclusions are right, but if there could be, you know, a little working group to just maybe massage that language, that could work. Or if not, you know, again I basically agree with the thrust and the conclusions in the report. I didn't see a real need for that push.

MR. COOPER: Actually our difference is not a fundamental one; it has do to with emphasis. And the fact that we emphasize the use of technology rather than reallocation I think is valid and I would not want to compromise that at all. Yes, there ought to be reallocations, but to start off

with an assumption that's going to solve the problem is just a red herring and we --

CO-CHAIR TRAMONT: Which I don't support either. I mean, it's not the only answer to the problem, absolutely.

MR. COOPER: Yes.

CO-CHAIR TRAMONT: But it is one answer, I guess.

MR. COOPER: But I tried to make the point that we've got a hundred to one difference. And to put them with equal weight I think is a distortion.

CO-CHAIR TRAMONT: That's where we disagree.

MS. WARREN: I did go back to try and look at this in the interim between the start of this meeting and now, so it's a very short interim. And I did try to kind of check some of this and, you know, obviously it's in the eye of the beholder, but if you look at the introduction section -- and I will try not to use too much time here, because we're not

really looking at the advice, we're looking at, as you said, Bryan, the introduction and the context. If you -- and this pains me to do it this way, but the fifth line. It says, "The purpose of an inventory should be to add to the policy makers' tool kits in efforts to enable and promote more intensive use of existing allocations and assignments, rather than solely for the reallocation or re-purposing of spectrum." That suggests that reallocation and re-purposing is definitely part of the policy makers' tool kit, yet should not be exclusive. That is not the balance that you're seeking?

CO-CHAIR TRAMONT: That is the balance I'm seeking. It's the page 2 part where we say that the fundamental precept of redistribution needs to be challenged. Page 4. It says, "Reallocation cannot have a significant impact on long-term need for spectrum." And my point is I agree with Marty that the amount of improvement that we need in

capacity over the next 10 years is tremendous. And if you were to take today's technology and add 100 megahertz to it, it will not solve the problem. It's the combination of the two. It's more spectrum combined with more efficient technologies that gets us there.

So, the concern I have on page 4 and then the related concern on page 5 is the nature of the discussion which seems to suggest that we shouldn't be focused on redistribution, because I think it's a very important element of how we're going to get to where we need to be, whether it's for CMRS or for other uses.

MS. WARREN: I think you're raising a fundamental challenge though, that when we look at the various sources of demand for new spectrum, redistribution and reallocation can't solve everybody's problem.

MR. EPSTEIN: Nobody's saying that.

CO-CHAIR TRAMONT: That's right.

MS. WARREN: I realize that. I think it's suggesting here going forward that given that you have competing demands that may be inconsistent unless we come up with sharing that it's going to be a ping pong back and forth. How do you satisfy all the different sources? Redistribution of useable spectrum may be quite a challenge to meet all the different sources. And I understand we need to find a balance there. You're not saying it's all one way and no one's saying it's all the other. It's just how to use that. Because when you go up above, it says, "Potential results may include redistribution of existing assignments."

MR. EPSTEIN: Right.

MS. WARREN: I suppose we could say there "of existing spectrum assignments" and could we say "allocations?"

MR. EPSTEIN: Look at page 4.

MS. WARREN: I am.

MR. EPSTEIN: It would take about

three word changes.

MS. WARREN: Right, and what would be the three word changes? I mean, because we have to adopt this.

CO-CHAIR TRAMONT: Right, the question is could this be worked out and edited. Is there a real problem that would be something that people need to just read about and have a separate document, or is it something on which we can find a common ground? I suspect it's common ground. That has been my aspiration on this. And it is that first paragraph.

And to your point about reallocation being a zero-sum game, I mean, that's what we've done for 30 years. I mean, we reallocated repeatedly to meet changing demands when we've had lots of different people who wanted spectrum, whether it's the federal government or commercial or public safety. So, that is the nature of the exercise. And at some level, as long as we

have command and control, government is going to be forced to make decisions about the evolving needs of the regulatees that they address, so about the uses they regulate.

MS. WARREN: I don't disagree with that. I think the entire sentence is a little bit more nuanced than that. But perhaps we can work it.

CO-CHAIR TRAMONT: Yes, it would be the first few sentences of page 4 and then, as I said, the discussion on page 5. Those are the two places where I was most concerned.

CO-CHAIR HATFIELD: Marty, do you have any rebuttal?

MR. COOPER: Well, I assume we're going to look at that. You know what, we'll work out your first --

CO-CHAIR TRAMONT: Very good. I mean I think --

MR. COOPER: -- possibly. But your second comment, I must tell you that I think we have a disagreement.

CO-CHAIR TRAMONT: About whether there should be technology mandates?

MR. COOPER: About whether market forces alone will in fact solve the technology problem of spectrum efficiency. Did I mischaracterize what you said?

CO-CHAIR TRAMONT: I think our characterizing each other's views slightly differently. On page 5, "It's crucial that licensees are obliged to use advanced techniques to increase spectrum capacity. I am not comfortable with the idea that the subcommittee or that the full committee would recommend an efficiency mandate all services. I think it may be a tool that is appropriate for certain types of services, but I'm not comfortable with the idea to say that licensees are at large to be obligated to that, because it's not clear to me that market forces don't work. That may be an area where we disagree. But I think a lot of the experience in the CMRS bands demonstrates that

there is a market place incentive for people to become more efficient. That's how we've made the progress we've made for the last 25 years.

MR. COOPER: Yes, except that that's where we disagree. But I have to look at the all services. In the CMRS there's no question in my mind that performance has been very poor.

DR. ALDER: Can you speak into the microphone, please?

MR. COOPER: I'm on the microphone.

Yes, the performance of CMRS has actually been extremely poor compared to what should have been done, and maybe that argument alone is worth stirring up some --

MS. WARREN: Could I offer a solution? Perhaps we could just simply say it's crucial that regulators consider whether it's appropriate to oblige licensees to use advanced techniques. Could we do that.

CO-CHAIR HATFIELD: It goes back to the incentives, right? In some cases you've got strong commercial incentives to be more efficient. In other situations there may not be any economic pressure to be more efficient. And therefore, to me, in the one case you can rely on the market place and in the other you may need to be a little bit more proactive.

MS. WARREN: I'm trying to avoid the philosophical divide between using market forces or not using market forces, because that seems to be at the heart of what I hear to be the divide, as opposed to just saying that the regulators consider whether it's appropriate, you know, and then let the regulator decide the market discussion, because that's where I hear the philosophical divide between the --

CO-CHAIR HATFIELD: And I wasn't saying you countered it.

MS. WARREN: Okay.

CO-CHAIR HATFIELD: Yes.

MS. WARREN: Would that be all right? Would that be all right, Marty?

MR. COOPER: I suppose.

MS. WARREN: Thank you.

MR. COOPER: The answer is yes, but insofar as there's a record of the verbal part of this thing that we have created a system that motivates people, if they have an opportunity to get more spectrum, to actually be spectrally inefficient. And that's the only point that I was trying to get at in this document, and I obviously did a lousy job. But there is something in the system that is broken in that regard and I was hoping the committee could at least make a statement that identified that for people to work on.

CO-CHAIR HATFIELD: I think there's a little bit of a burden of proof here issue as well, because I could take the same evidence, I think, and look at the efficiency gains since I started in the business and

where we are now, and I could make a pretty persuasive argument, I think, that we have made. We may not have achieved as much as we could have, but I think it's mis-characterizing the record to say that there hasn't been enormous efficiency gains compared to back to the old IMTS days, back when I started in this business.

MR. COOPER: No, I'm taking all the credit for the good efficiency gains. Since then there haven't been an awful lot --

CO-CHAIR HATFIELD: Yes, at least in my, as recently as yesterday, as talking places on the market place, I see the carriers today desperately looking for ways to be more efficient now by doing things like picocells, getting more intense frequency reuse and so forth. And some of the issues like smart antennas and so forth, you get into the issues of zoning problems and stuff like that, how big that antenna structure is and so forth. So, you know, I'm pretty convinced there's

been good progress and I'm pretty convinced right now that carriers are looking pretty hard at ways of handling this data explosion.

MR. COOPER: Yes, but we do have a severe disagreement there, because I have specific evidence, and we are not going to cover that here, of carriers not doing things they could have done to get the order of 10 times improvement in spectral efficiency. So, yes, they've made some progress and --

CO-CHAIR HATFIELD: But that comes back -- and, Marty, I can't argue with you here; you're too well regarded, but there are other issues. If a person hasn't done it, there are issues like zoning. Some cities you can't do certain things with large antennas, you know? There's high-mobility applications where you have issues. And so, I don't think you can say condemn a group without going back and looking at how much would it cost were there barriers, zoning barriers to doing some of these more sophisticated systems and so

forth.

MR. COOPER: Well, we're absolutely not going to solve that problem today.

DR. ROSSTON: This is Greg Rosston. It may not be economically efficient to put in the most technically efficient system at this point in time.

MR. COOPER: That's what I was trying to say.

DR. ROSSTON: -- technical tradeoff.

MR. COOPER: But a solution is not a technical solution if it's not economic.

CO-CHAIR HATFIELD: Gerry, do you have something else?

MR. SALEMME: I was going to amplify what Dale said. I think the real world, the cost and some of the other barriers to providing some technologies does have a lag effect. But I'm satisfied with the solution that has been recommended by Ms. Warren.

CO-CHAIR HATFIELD: Jennifer, you have some language?

MS. WARREN: Well, while you continued to disagree, I went back to the first point to see if I could --

CO-CHAIR HATFIELD: Respectfully disagree.

MS. WARREN: Respectfully disagree, yes. I went back to the first point because I think there would probably be a high level of comfort if we just had this document finalized rather than massaging this afterwards. So, I thought to try and address the point that Bryan raised on page 4, and I put this to everybody. The sentence that begins, "Concerning the first approach," if we softened this so that, "We respectfully suggest that the fundamental precept of redistribution can be challenged, revisited and that while an audit may offer some small short-term results, it may not have a significant impact, blah, blah, blah." And

then, "The concept of redistribution is based upon a presumption;" delete the word "flawed," and then leave that as is. And we could --

MR. EPSTEIN: You could delete the sentence that says "not true," although I want to be careful how we --

MS. WARREN: I hadn't gotten to deleting that. I was trying to delete I think some of the absolutes.

MR. EPSTEIN: Why don't we delete the whole paragraph? I mean, it's not relevant to the rest of the --

MS. WARREN: Because I think it.

CO-CHAIR HATFIELD: Right.

MS. WARREN: Well, but I think it raises questions that some people were very comfortable with in the subcommittee about whether or not it's an absolute truth going forward as opposed to raising questions.

CO-CHAIR TRAMONT: I guess I'd be more inclined to do so if it's open. It should say something like "redistribution

alone cannot solve the long-term infrastructure." That to me seems to be the point.

MR. EPSTEIN: We have a minor subcommittee over here.

MS. WARREN: Okay.

MR. EPSTEIN: But Marty hasn't had a chance to look at it yet though, so I --

COURT REPORTER: Microphone.

MR. EPSTEIN: Let me just try this and see if it works again. "Concerning the first approach, we respectfully suggest that the fundamental precept of redistribution needs to be challenged. It alone cannot be the sole answer on the long-term need for spectrum. The effective size of spectrum is not fixed and unchanging." And then just strike "this is not true." I think that makes the point.

CO-CHAIR TRAMONT: That sounds good.

MR. EPSTEIN: It's up to Marty.

MS. WARREN: Could you repeat it one more time? It's actually up to the --

MR. EPSTEIN: It's up to the subcommittee, but --

MR. CROSBY: And then if everybody wants to bless it, that's fine, but it's up to the subcommittee. We're not blessed.

MS. WARREN: Could you just reread it one more time?

MR. EPSTEIN: Sure. Let me be more precise and tell you what I struck and what I didn't. "Concerning the first approach, we respectfully suggest that the fundamental precept of redistribution needs to be challenged," and then strike the rest of the sentence. Now begin with the end of the sentence, "It alone cannot be the sole answer on the long-term need for spectrum." Then strike "The concept of redistribution is based upon the flawed presumption, which is that" and begin, "The effective size of spectrum is not fixed and unchanging," and strike "this is

not true."

MR. COOPER: Why did you strike "this is not true?"

MR. EPSTEIN: Because it's an absolute. We're trying to be more nuanced on it. I do say it up here. What we say up here, that redistribution alone is not the answer. That's the same thing as saying --

MS. WARREN: Or redistribution is not the only option. I think that's the point. It's not whether it is the option plus other things, whether it is an option, not necessarily part of the option. I mean, not necessarily part of the solution. There's a difference.

CO-CHAIR TRAMONT: I'm sorry, what was your proposed change?

MS. WARREN: That redistribution is not the only option.

CO-CHAIR TRAMONT: That would be appear to be a harmless --

MS. WARREN: The question is

whether we're deleting the part of the sentence that says "an audit may offer small short-term results." I don't recall quite honestly whether or not we've made that point elsewhere in this document, and therefore it's a throw-away there. I would have to quickly look and see, because I think that's a point we --

MR. CALABRESE: It's awkward because we're not talking about the audit itself here. We're talking about what you do with the results.

MS. WARREN: Right. That's true.

MR. CALABRESE: So, we should strike that anyway.

MS. WARREN: I think we've got the point about the value of audits later, Marty, so we'd probably be fine if that's okay with you.

MR. COOPER: And this thing about the effective size of the spectrum?

MS. WARREN: That's there. That

stands.

MR. COOPER: What do you mean? You just exactly reversed it.

MR. EPSTEIN: No, no, I didn't mean to exactly reverse it.

CO-CHAIR HATFIELD: We need to help the court reporter here.

MS. WARREN: Gary, make sure you speak into the mic.

MR. EPSTEIN: I'm sorry. Your point was that if the flawed presumption is that it is fixed and unchanging. I just took out the inflammatory words "flawed presumption," but kept your thought, which is the effective size of spectrum is not fixed and unchanging. I didn't mean to change your concept.

CO-CHAIR HATFIELD: Oh, I didn't see the word "not" in there.

MR. EPSTEIN: No, I put "not" in there.

MS. WARREN: Thank you.

MR. EPSTEIN: But I truly hesitate to --

CO-CHAIR HATFIELD: Look, I really need to one more time, just so the record's clear.

MR. EPSTEIN: I will. Just as a preface, I truly hate to even engage in the discussion with somebody who'll be on 60 Minutes this Sunday on cell phones.

CO-CHAIR HATFIELD: That's the reason I was hesitant.

MS. WARREN: Do you want to reread it again, Gary?

MR. EPSTEIN: Do you want me to give it to you?

MS. WARREN: Would you, please?

MR. EPSTEIN: Yes.

MS. WARREN: Okay.

CO-CHAIR TRAMONT: So, can we read it aloud for the record one more time, and then we'll be done with that?

MS. WARREN: "Concerning the first

approach, we respectfully suggest that the fundamental precept of redistribution needs to be challenged. Redistribution is not the only option. The effective size of the spectrum is not fixed and unchanging. There has been a continual growth, blah, blah, blah."

That is what between the two of us we talked about as the final package. Is everyone comfortable with that?

MR. CROSBY: You say the spectrum is not fixed or fixed?

MS. WARREN: Is not fixed. The effective size --

MR. CROSBY: "Effective" is the key word there, right?

MS. WARREN: "Of the spectrum is not fixed and unchanging."

MR. CALABRESE: Deleting "it is not true," but adding "not fixed."

MS. WARREN: Yes, deleting "this is not true." I didn't read all the deletions. I read it as it reads.

CO-CHAIR HATFIELD: I will say it's the effective size, but you do begin to run up against Shannon's Law here at some point. There is some fundamental constraints that you bump into.

MR. COOPER: No, that's not --

MS. WARREN: Microphone. Microphone, Marty.

MR. COOPER: -- some place. Aren't we in effect creating more spectrum?

CO-CHAIR HATFIELD: But there's limits to how far you can go in terms of frequency reuse, because you run into problems like you're in the middle of a national cemetery and it's kind of difficult to put a cell site in the middle of that. And that tends to constrain, I think, sort of the minimum cell sites. Plus, and you know this, but when you're traveling at very high speeds, at 70 miles an hour, if you're going through cells at the rate of several hundred per minute, I think there's an interesting

technical challenge. Help me out, Dave.

DR. BORTH: Yes, so that's definitely the case. And we're kind of glossing over all of this; and I mean there's other people on the committee that can talk about this also, but, you know, certainly there's been a Shannon theory that's been developed for kind of what we call the static and fixed-antenna mode. In other words, a follow on to this that came out with smart antennas. And these were all very well adopted and very well understood mechanisms and that's really driven forward this whole smart antenna concepts.

But you're right, we'll eventually hit these limits and so it's not we can do this forever. It will stop. And then there's this other little point you brought up about crossing cell boundaries and doing hand-offs all the time. We realized this a long time ago at Motorola that this is a fundamental problem. You can't just hand off altogether

the -- even if it's all IP-based, it'll collapse at some point in time. So, your point is very well taken.

MR. COOPER: I just have to argue with you. Of course the generalities that you state are true, Dale and David, but the reality is that there are systems and operations today that operate at a 100 kilometers per hour that have huge increases in spectral efficiency using smart antennas and they are cost-effective systems. And that's why I suggested to Juli that perhaps if the FCC looked at these things and started dealing with facts instead of these generalities that maybe we could be urging people to use new and better technologies. So, and that was my biggest problem with the congressional action. They're using reallocation as an excuse, as a red herring, as a way of not promoting the importance of technological improvement of spectral efficiency.

CO-CHAIR HATFIELD: Well, I think we've got the issue teed up pretty well at this point.

MS. WARREN: So, does that mean we can leave the language as I last read it?

CO-CHAIR TRAMONT: You own it, yes. So we adopt it with editorial privileges to do what we need to do and any other cleanup. And then ideally it would be posted on the Web site within a week to 10 days kind of thing. That's fine.

MS. WARREN: This is the deadline to get this to whomever we need to get it to cleaned up.

CO-CHAIR TRAMONT: Yes, a week to 10 days. I don't know the date specific.

Okay. So with that and the amendments, all those in favor of adopting the report as amended, please signifying by saying aye.

(Chorus of ayes.)

CO-CHAIR TRAMONT: Those opposed?

(No audible response.)

CO-CHAIR TRAMONT: Excellent. Good work by the team.

All right. One down. Mr. Mylet, of course, much less controversial.

And, Darrin, the Transparency Subcommittee final report?

MR. MYLET: Well, Dale did not tell me to jump off a bridge. I would like to see Phil jump off a bridge into the Potomac though. That might be a YouTube classic.

But nonetheless, he did ask me to try to get this done, and I think we were able to get this done. Great contributions by most everyone on the committee and those outside the committee.

Obviously, transparency was the number one issue topic today. We heard from the FCC. They appear to be making progress with regards to the spectrum dashboard, which I think is a good first step. Personally I think it has a long way to go, but they're

working on that. And I think based on the recommendations here and when leadership gets a chance to digest these recommendations, hopefully it will inspire more dialogue, more question and more work with NTIA. NTIA has been very helpful in reviewing the document and trying to educate us on spectrum transparency within NTIA. Obviously we're a bit in the dark when it comes to understanding how spectrum is managed within NTIA, but we certainly learned a great deal over the past several months from NTIA staff.

And we hope to take this document and identify some of the good things that are recommended and hopefully Larry might be able to come back to us and say we really like a few of these and maybe our group would expand upon digging a little bit deeper and coming up with even better suggestions and recommendations. And hopefully those are applied and we move forward.

CO-CHAIR TRAMONT: Feedback on the

transparency draft?

(No audible response.)

CO-CHAIR TRAMONT: Okay. Hearing none. Any comments on the phone?

(No audible response.)

CO-CHAIR TRAMONT: Okay. With that, move for adoption with editorial privileges with the idea of posting it on the Web site in seven to 10 days, all those in favor, signify by saying aye.

(Chorus of ayes.)

CO-CHAIR TRAMONT: Opposed?

(No audible response.)

CO-CHAIR TRAMONT: None. The ayes have it. The item is adopted.

We will now turn to David Donovan who is presenting the first draft of the Adjacent Band Dynamic Spectrum Access Subcommittee draft.

MR. DONOVAN: Thank you, Bryan. What you have before you again is the first draft of a report that covers frankly a broad

scope, including both interference and also discussion of at least the leading dynamic spectrum access proposals. We also discuss a number of issues regarding enforcement and also make some recommendations regarding receiver standards.

But let me start by thanking the subcommittee, and in particular David Borth and the Motorola team, including Brad Hibben, Janice Obuchowski and Mary as well. Thank you. Brian Fontes, Dr. Mark McHenry, Neville Ray and the T-Mobile team. Gerry Salemme, Bob Callett, Dale Hatfield for your contributions as well. Dale, Pat Welsh, Joe Gattuso and the NTIA team as well.

What we tried to do in this document and what you have before you is first to try to isolate the major types and forms of interference that one may encounter. And in particular, we discuss issues regarding co-channel interference, the concept of inter-channel interference, which is interference

among channels, and included within that are issues regarding out-of-band emissions, adjacent channel interference, spurious responses, inter-modulation and receiver blocking and overload. We also discuss in particular questions regarding the interference, discuss interference scenarios including the transmit/receive scenarios and near/far scenarios. By and large a lot of this is focused on the mobile aspects as well, which I think is most appropriate given the nature and scope of this committee.

Having discussed the sources and types of interference, we make some preliminary recommendations regarding various interference mitigation techniques.

But before I get into that, we discussed as a group; and I think this is important, the question of whether or not there is interference. In many respects it's a policy balance a policy question. For some services the question is whether or not it is

harmful interference. In other contexts it's talked about in terms of disruptive interference. So, rather than redefine or create a universal definition for what is harmful interference or disruptive interference, or what is inappropriate interference, that's really going to depend and vary from service to service. It's also going to vary from the types of services that are going to share spectrum. Certainly those analyses; for example, if you're sharing with public safety, may turn out to be vastly different than if you're sharing in a classic commercial context. So, I want to make that statement up front.

The document itself, we started the document by saying harmful interference throughout and figured out that that really was inappropriate. So, when you read the document, you will see the term "interference." That should not be interpreted as sort of any interference.

Impute over that term whatever would be the appropriate legal definition of "harmful" as you go forward. And we say that right up front in the executive summary. So, rather than trying to redefine it as we go forward, I think that is an issue. It may be an issue that needs further work. Whether interference is harmful really is going to depend on service-to-service analyses. And I think if we tried to define a uniform definition, we would be here probably forever.

So, with that sort of notion up front, let me go forward I think with the major interference mitigation techniques that we looked at and some basic recommendations.

First, with respect to guardbands, guardbands in many respects are a time-honored and effective way of reducing interference. They've been used both by the government and by private entities as well. We recognize it as an interference mitigation tool. It would be appropriate to use that on a going-forward

basis. I think the policy question that we try to address here is, okay, if it does work as a technique, where should it come from? In other words, if you have a new service that is sharing, should the guardband on the spectrum to use that guardband come from an incumbent service or from a new service?

I think it was the consensus of the committee that when a new service is coming in and either sharing spectrum either adjacent to or within band, it would be easier for the new application and the new service to make adjustments. As a result, the consensus of the subcommittee was that the guardband, if any, if that is an appropriate mechanism, should come from the new service that's entering rather than extract from the incumbent or the old service.

That certainly is a policy cut. It's a policy cut that the full committee I think really needs to discuss. But I think imbedded within that is the concept that if

you are trying to create incentives for the development of communication systems there has to be at least some certainty with respect to how much spectrum you have. This issues crops up again in terms of expectations regarding interference avoidance down the road. So, that sort of is a fundamental concept. You see it right up front in the guardband recommendation.

There was also an issue; and in fact I want to thank NTIA for some of its contributions in this -- is that there appears to be, particularly if you're looking at guardbands with respect to out-of-band interference, that the current definitions and applications that are often used in which you're applying out-of-band interference standards that the commission has used, may not be applicable in all circumstances. And so, that really needs to be revisited almost on a case-by-case basis and updated. You just can't take the current standard or the current

standards that's in Part 15.209 and uniformly apply them across the board. That actually maybe created some issues. So, I think that was one of the cores of the recommendations.

We also looked at frequency coordination recommendations and we noticed again that frequency coordination has been an appropriate and an effective tool going forward, used both by private entities and by the government. We do recognize however that on a going-forward basis, since the demand for spectrum will be greater, that you are more likely to have essentially heterogeneous or disparate services trying to share spectrum, and that may make the task far more difficult. Also, it may be more difficult if you're trying to share spectrum with an unlicensed entity to the extent that unlicensed device is "un-tethered" or not connected to an accurate spectrum database or other management system controls. So, I think special care has to be looked at if you're trying to share in an

unlicensed band.

To the extent that there may be more government/commercial sharing and sharing among very disparate industry groups, you may need more government oversight in the context of that sharing. However, we also recognize; and I want to thank Dale for this contribution as well, and candidly we've been using it in broadcasting for years and didn't mention it in the first draft, which amazes, is that the private sector in terms of doing frequency coordination, whether it's negotiated interference rights or things of that nature, is an important and valuable tool and should not be neglected on a policy basis going forward.

We then looked at dynamic spectrum access recommendations and we really looked at essentially two of the major approaches that are being discussed today. One is cognitive radio and spectrum sensing and the other is sort of a geo-location/database approach. We

reached the conclusion that dynamic spectrum access may offer new opportunities to increase spectrum sharing options. But it also may have certain limitations, depending on what you're trying to share with. What we believe is that sound spectrum policy requires a realistic assessment of the interference avoidance mechanisms of the various DSA techniques; and this is important, through additional testing evaluation, including NTIA's ongoing Test Bed Initiative. But if there is one key thing to be gleaned from this recommendation, is that the government really does need to devote more sources, both to testing, particularly field testing, and research of dynamic spectrum access techniques. That is vital. I think these will be important tools sharing going forward and additional resources really need to be devoted.

Bryan, I don't want to go on forever. I'll just hit some of the highlights

and not every bullet here; they are rather extensive.

Again, cognitive radio will be an important tool. We do believe that NTIA and government entities responsible for spectrum management with respect to cognitive radio and spectrum sensing should look at some basic things.

First, I think we do need to establish specific procedures and ongoing testing particularly when you're involving sensing and using different system architectures when you're trying to share spectrum.

Secondly, with respect to sharing, it's important to look at the parameters of the devices on which you're sharing with so that any spectrum sharing comports or at least assumes or looks at the interference and the characteristics of the devices on which it's sharing. This may call an application for a case-by-case basis for each radio device as

the technology becomes available. You may want to even exclude certain bands from dynamic spectrum sharing such as police bands or safety of life issues. But again, I want to say may. I mean, that certainly doesn't mean all.

Again, further field testing is necessary and we do believe and make recommendations that you should focus on some specific areas. First of all, is the overall efficacy of the device to protect fixed, mobile and portable devices. The potential for interference to a DSA device that may be due to the hidden node problem. And, you know, I can go into discuss that further if you want, but essentially if you have a sensing device out there that is trying to sense its surrounding environment and it happens to be behind a mountain or behind an area and that device is now sensing at a level that says, no, that channel is unoccupied, you may run into problems with that approach.

Now, there are solutions to that. They certainly need to be explored, but if you're going to do testing, I think the hidden node problem is an issue.

The other question is essentially is how low would your sensing ability take you? And I think that is an absolutely critical issue.

Another point, which is the false alarm problem. You can create a device that is so sensitive that it always registers as channels being occupied. But that's really not an effective device and it certainly isn't a device that will work in the marketplace or a device that one would share with. So, further work on that we think is important.

I think the other thing is that when we're testing, we have to really look at the device in the context of the entire ecosystem with which it's going to exist rather than you just can't simply rely on a lab report. You have to look at how the

device is going to be used; for example, how is it going to be used with the antennas and how the antennas function on the ability of that device to sense?

We did get very, very specific here. I do think that this can serve as a guide for further testing and evaluation on a going-forward basis. But again, I do want to emphasize that we need a concerted effort for more resources to be devoted at the federal level to begin to work through these issues.

The second set of issues involves database and geo-location approaches. At the outset I think the subcommittee certainly approached the idea that you need a database. An inventory is a good start from a policy standpoint. But more importantly, if you're going to use a database approach, it's absolutely critical that the government conduct a very, very thorough inventory of the spectrum upon which sharing is going to take place. If you have a comprehensive database,

you can move beyond sort of the spectrum planning tool and actually use a geo-location/database approach as a very effective sharing technique. In looking at that and as we begin to drill down on that, there are a number of issues that we believe NTIA and other government entities should take a look at.

The first is that if you're going to use it as a spectrum tool, depending on the devices that are going to be shared, that database ought to be able to operate and react in real time. This is especially if you're trying to share with cellular devices that may be on or may be off. I know in the broadcasting realm we have run into it in terms of using licensed environment microphones in real time in spectrum sharing. So, that database to be used as an effective tool really has to develop and move towards that approach.

The other issue is maintaining

administrative control over the database and who should do that. One of the issues that you run into with a database is looking at the government's ability to maintain and operate a database. And while the spectrum dashboard is a step in the right direction, those of us who have used the FCC's database over the years realize that there is not a broadcast station licensed to the middle of the Atlantic Ocean. What that calls for in many respects is using a private entity to help manage the database, particularly in real time.

Once you make that or cross the Rubicon, then the question really becomes one of control and how much control should the government or oversight have over whether it's a database administrator a database provider. And we believe; at least there was a consensus on the committee, that the entity, if that is delegated out to a private entity, that the government has to maintain direct oversight over all aspects of database management,

including information distribution to the database administrators, spectrum managers and devices relying on the database information.

The next set of questions comes forth. On using a database, who can access it? Because obviously we don't want a database administrator, you know, opening up from Kazakhstan and just with absolutely no responsibility to the United States whatsoever creating problems or allowing devices to be turned on that shouldn't be turned on. I think the bottom was is that there was a consensus that access to the database to use that type of system should be limited to devices that have in fact been certified or approved by the FCC or the relevant government entity involved. It may be NTIA with respect to government spectrum. Moreover, that before the device is necessarily turned on, they ought to receive appropriate authorization, an authorization code from the database or the administrator before transmitting on a

frequency.

The importance here -- and I'm going to stop because I could go on forever, Bryan, on this. But the importance here is to get end-to-end security so that you're not in a situation where the system is being spoofed and that technical security of the database and of the devices being used is critically important. We also ought to look at the ability to have remote shut-off capabilities to the extent there is a problem in a particular device may in fact be interfering.

Again, I think the idea is, depending on how you're sharing will depend on what DSA technology you want to use. In some instances, you may need both, which is both sensing and/or using a database approach.

There are other approaches to spectrum sharing, and this certainly didn't intend to focus on all of them, but those were sort of the leading ones that have been discussed recently and so we decided to focus

on that.

Am I going too long?

CO-CHAIR TRAMONT: Yes, just for 437 maybe we could have a brief overview.

MR. DONOVAN: We also looked at the idea that in order to facilitate that harmonization of spectrum is really important. And also, in allocations decisions sharing like services and mixing disparate services, sharing like services is better if you can achieve it.

We also looked at equipment recommendations. And let me focus on this, because this again is a very, very complex issue. The subcommittee believes that if you are truly going to focus on spectrum sharing or spectrum efficiencies in the long run you have to start looking at equipment and that the government right now is not truly prepared to focus on equipment as a form of spectrum efficiencies. And so, whether that is in the form of equipment standards or -- importantly

we recommend developing a process for the wide-ranging evaluation of devices to arrive at that approach. I think it's going to vary from service-to-service, but we do need to get that process started. And historically there have been tradeoffs between spectrum efficiency and consumer cost, which is why additional work from the government is important.

There are specific recommendations regarding filters in here and what could help. I think one of the policy issues which we would like to put forth before the committee is if I have developed a service based on a particular technology that I am now providing to consumers, that is being designed to operate in an environment as it exists at the time that I am providing the equipment. Question: Should the device that I'm providing consumers and manufacture anticipate future sharing? Should it build in the margin down the road? I think there was a consensus, at

least at the committee, that that may be inappropriate at this stage of the game, that to try to avoid in a consumer device interference for which you're not sure what it will be, either from a fixed or from a mobile device, what are necessarily increase the cost of equipment.

Having said that, there's a balance. You don't want to simply protect bad or old equipment, you know, forever. And I think one of the points that we looked at was, well, let's take a look at the turn rate in any one particular industry. How often are consumers turning over their equipment? And perhaps that could be a key in looking at future sharing.

The other issue I think which is important is that in future auctions we think it is important that if you're buying spectrum or being allocated spectrum, you really do need to know what's around you. And so, creating a clearinghouse of information

regarding the equipment that is around would be very beneficial on going forward and help folks plan accordingly.

The final; and I will wrap it up, is enforcement. I think right now there was a consensus in the committee that the FCC and the government entities managing spectrum, that there are significant enforcement problems with respect to monitoring interference, with respect to handling interference, to resolving interference complaints in a timely fashion. We recommend a shot clock. We also recommend that in certain contexts perhaps a sort of model of a temporary restraining order be put into place, and those balances are explained further in the recommendations.

And with that, Bryan, I want to thank you.

CO-CHAIR TRAMONT: Terrific. Actually a lot to chew on there.

Any reactions to David as you all

are sitting around the table, around the phone today? This is the beginning of the dialogue.

MR. DONOVAN: Yes, and this was drafted by committee, so each section reads a little bit differently.

DR. BORTH: It's a two-staple document, too.

CO-CHAIR TRAMONT: Yes, it is. We should note that. David has taken us to a new level. Apparently the stapler could not go all the way through the 71 pages, so we have a one through 50 --

MR. GURSS: Bryan, for those of us who are not part of the group, if we have comments, we just send them to you, Dave?

MR. DONOVAN: Yes, please.

MR. GURSS: Okay. Just sort of scanning one section on frequency coordination, I had some thoughts, so I'll pass those --

MR. DONOVAN: Okay. Thank you, Bob.

CO-CHAIR TRAMONT: So, I would urge folks to try and get, you know, edits to David during the course of the next few months before our next meeting with the idea that at the July meeting, which we'll talk about scheduling later, we would do a final and adopt it.

MR. DONOVAN: Just please make sure all your edits are consistent with each other.

CO-CHAIR TRAMONT: Yes.

MR. REASER: You know, one of the things that you mentioned at the end about this issue of technology mandates; I know that Bryan hates that, but in reality, you know, I'm not allowed to drive my horse and buggy on the freeway anymore. There's a technology mandate. I got to have a car. And in fact, I can't ride my bicycle on the freeway. There's a whole bunch of technology mandates out there. And why is it that we are so afraid to do that here? We got to look at

what the market turn is. You know, at some point, you know, I'm sorry, my DOS -- Microsoft has mandated that the C colon prompt doesn't work very well on my Windows 7. And all these DOS programs I have -- now, they mandated that; that wasn't the government.

But the point is, I think at some point you touched on this. You said new options need to look at what's around you. And maybe new options and new things need to look at, okay, I got to upgrade to Windows 3.0 now, you know?

And so, I think that needs to be -- because the other thing I applaud you on, you mentioned about receiver specifications and standards as something that's long overdue. This is causing all sorts of issues; certainly in RADAR, I'll be honest with you. We're protecting things that should have been thrown into the heap.

MR. DONOVAN: I agree with you. I guess what we were trying to balance -- I'll

let others in the committee speak, because I think that there is a maybe a continuum of opinion on this, is that -- and it does depend on the service. And I can speak from a broadcasting standpoint. I do have right now based on certain technologies and certain sort of planning factors -- you have $109 billion worth of consumer equipment that is based on over-the-air digital televisions and the 34 million converter boxes that consumers just purchased. Do I within six months or seven months or ten months develop a sharing proposal that may render a lot of that equipment obsolete? And so, what you really do have to balance of course is stranded investment.

Now, that's on the broadcast side, and frankly, that investment has been made by the consumer electronics companies. It's not a subscription-based service. The ability to flip equipment out is more complicated. But if I, for example, sold, you know, hundreds of

millions of dollars of police radios to various jurisdictions across the country, it's little solace to them to say, oh, we've got something better. Go to the city council. Raise local taxes and just have the police use those devices for paperweights. I mean, you have to try to find the right balance. Maybe we found it here, maybe we didn't, but I think you really just have to be careful just saying, okay, let's go to the next, let's go to the next, let's go to the next.

CO-CHAIR TRAMONT: You have to take into account externalities. I mean, roads are a commons, right? And so in commons, in spectrum commons we have technology mandates, which I'm much more comfortable with, and the notion that -- you know, I think we've done pretty well with the marketplace adopting cars; that seems to have worked out well. So, you know, I'm pretty comfortable with the idea that the market has incentivized participation in the commons and

I think a similar approach to spectrum makes sense.

The externalities that David talked about are real and any technology choices we make we have to be very conscious of what the externalities that are caused by our decisions are. And to me, that's what interference is. It's a way to internalize the --

MR. DONOVAN: Let me just add one more thought, because we did discuss this. Because if you look at this long term, and I look at investment in communications technologies, and I'm putting a lot of money up front, why would I do that if five years from now I may have to complete -- the devices may receive interference or I may have to roll out devices? What you do over the long run is actually dis-incent some of the investment.

Now, it may be good for the first step. Okay, the first guy and then I get more advanced. But even that more advanced guy in

step -- you start at step A, then you go to step B. Well, that step B guy five years later is going to have a C one that could jump in on him, then a D, then an E. And when you step back and look at it, you may actually reduce the certainty for investment in your services. And again, I don't have solid answers here. It's not a black or white issue. But frankly we're trying to figure that out.

MR. REASER: My only point was it might be worth looking at whether the old ways of thinking about this still apply given the rapid turn. Because I'm going to tell you, try to go to Blockbuster about a year from now and rent a VHS tape. I mean, that's --

MR. DONOVAN: Yes, I think --

MR. REASER: Yes, because who would have thought? I mean, gosh. In fact, if you look at how much Blu-Ray there is at Blockbuster now.

MR. DONOVAN: But even if I go to

Blockbuster today for example in the television business and buy the brand new thinnest new huge wonderful set, the parameters to which it has been built may not have changed, so you have to begin to look at -- and the same thing is true with any radio equipment. And so, it's a touchy -- I apologize.

CO-CHAIR HATFIELD: I'm getting worried. There's another meeting right behind ours. And since this particular document is still open to further discussion and so forth -- I don't want to discourage you, but I'm getting nervous about the fact that there is a meeting right, right after ours. So, I need to be conscious of that. We need to be conscious of that.

Danny, if you want to --

MR. WEISNER: I'll pose a very quick question on Larry's behalf.

Thanks. Congratulations on first draft and I think the issue is worth a double

staple; it's important. I just wanted to relay one question on behalf of Larry. I'm Danny Weisner. I run the policy shop here.

I think that you raise a very comprehensive set of issues and possible work items for NTIA, for other parts of the federal government. I think it would help, I think we could use the committee's help in understanding a little bit about what the benefit would be on the other side of achieving, of implementing all these steps that you propose. Obviously the kind of for it's-own-sake benefit, it would help us to have a little bit of a picture of what happens if we devoted five times more resources than we have currently on spectrum test beds, for example, for DSA, what would we get from that? What would the country get from that?

This may reflect the fact that we're in the process of wrapping up our fiscal year '12 budget requests, but you should take that seriously because I think that if you

could provide the benefit side of this equation, it would really help strengthen the case that I think you're trying to make.

CO-CHAIR TRAMONT: With that, David, thank you very much. As I said, an excellent draft and I think we have a lot to work on for July.

So with that, Michael, talk a little bit about where we are on the Incentives Committee and then we'll do the chief scopes of work, and then open it up for public comment.

MR. CALABRESE: Okay. The Incentives Subcommittee; and this can be relatively brief since, you know, our work is at a much earlier stage even than David's subcommittee, you know, we essentially got going since the last CSMAC meeting. We met four times since then. Oh, and there is a little handout here with an update and an outline we're pursuing.

So, the discussion to date is

focused first on defining the policy purposes of incentives. You now, what are we actually trying to achieve? And you can read those. They're not too surprising. You know, promote more efficient use, expand access, ensure that spectrum-based solutions are actually even required, because there could be alternatives, and ensure the protection of systems that serve important public needs.

And then we got into -- you know, there's both what you might call sticks and carrots. And the sticks are along the lines of mechanisms based on internalizing opportunity costs. And so, one way to do that is spectrum fees. And so, we talked about what would be the economic framework of that? We had a very useful discussion with William Web from Ofcom who heads research and policy for Ofcom since they have now a 10-year history of phasing in an administrative incentive pricing system in the U.K.. And, you know, and we heard a rather mixed report

on the impact that, but it was very useful.

Although, you know, we're able to kind of nail down our goals, this notion of spectrum fees, who they should apply to? In other words, what users and incumbents in the federal government? You know, what sort of feasible means are there to internalize market evaluation considering the constraints and the purposes of agency use of spectrum? And all that's still under discussion. We haven't really reached a consensus on that.

We also have been able to talk about OMB Circular A-11, you know, which requires agencies in the procurement process to take account of the evaluation of spectrum in considering alternative systems. And we talked about, you know, the general sense that we have is that that's not really taken terribly seriously; it's not enforced. And so, we were talking about how to modify and strengthen the A-11 process. So, for example, should the circular be revised to require more

analysis and accountability with respect to the cost benefit of proposed spectrum use? You know, so we talked about an option being the certification process itself could be strengthened by bringing in expert third parties' opinion to bear. Or another possibility is self-certification but with a checklist that makes transparent sort of a required regime of analysis so that NTIA and/or OMB could see at least that the thought process was followed through.

And then we'll turn; and we haven't yet, to I think what will be a more pleasant discussion about, you know, the carrot side. In other words, mechanisms based on reimbursements, revenue, subsidies for efficiency. So, there could be positive incentives for spectrum relocation. The Commercial Spectrum Enhancement Act with its spectrum relocation funds is an example of that facilitating the clearing of federal bands for the 2006 AWS auction. There are

proposals pending in Congress, for example, to streamline that, and we'll be talking along those lines.

And then finally, positive incentives for spectrum sharing. How can we perhaps expand on the CSEA concepts and also look at things like secondary market transactions and details under that?

So, those are the categories. And I would welcome new members, any additional members, particularly among our three new CSMAC members. If you're interested in these important issues, it's always good to have more perspectives and expertise at the table.

CO-CHAIR TRAMONT: And committee volunteers, just let Joe know that they want to be included in a subcommittee.

Jennifer?

MS. WARREN: Yes, I think Michael did a great job of summarizing. I think we have one transmission error. This isn't the final version that you sent to Joe last night.

MR. CALABRESE: Right.

MS. WARREN: So, this is not actually the document that should have been distributed or made public. Perhaps we can make sure that the actual document that was the final version is the version posted as opposed to this version.

MR. CALABRESE: Okay. I don't see Joe. Where's Joe?

MR. COOPER: Michael, is it implicit in your committee charter that incentives are required, or that there should be a change in the system?

MR. CALABRESE: Well, we could reach the conclusion that the incentives are perfectly aligned right now and that we don't need any change.

MR. COOPER: Okay.

MR. CALABRESE: We're just going through a list of possible incentives, as I said, what you might call sticks and carrots, and deciding which may be more or less

feasible.

MR. COOPER: Do you object to having a trouble maker on the committee?

MS. WARREN: Always welcome more trouble makers.

MR. DONOVAN: Speaking of trouble makers, tacking onto what Gerry said earlier, in the idea of creating incentives, and sticks and carrots, and to Dr. Cooper's point, is there any differentiation made between the types of services? For example, the decision that one needs to incentivize, either public safety or broadcasting, is premised on the notion that -- or some value structure, that that use for the spectrum ought to be changed or different? And it comes into the fact where you're saying you're looking at, particularly with respect to spectrum fees, that you're optimizing. So now, if you go to optimizing value, how are you considering the sort of public good value of public safety or other types of services, and how does that

enter into your calculation in terms of creating in particular the stick?

MR. CALABRESE: Right. So, we've talked about that a lot, which is why one of the four purposes that we mentioned was to ensure the protection of systems and services that are serving important public needs, which basically takes those into account separately. We heard as well from the U.K. that for now they're treating broadcasting different, for example, than they do other uses. They treat public safety differently, but probably different than we will, or we could, because they actually require public safety to buy their radio services from the private sector. So, anyway, we have that in mind.

CO-CHAIR TRAMONT: Bob's taking his chair for that. That was very impressive actually. Okay. We're in the early stage of this one as well, but let's -- yes.

MS. WARREN: Just a quick comment, because I think you raised a point that we're

still on despite it saying tentative consensus, which really what is the opportunity cost and do we define it at the economists would, or do we define it in a different way? And there's vibrant discussion going on about that, which I'd welcome you to.

CO-CHAIR TRAMONT: Excellent attitude.

MR. DONOVAN: I think I may join on that point.

CO-CHAIR TRAMONT: Excellent. Looks like we'll have robust participation in Michael's committee going forward.

So, our goal here is to produce a draft report for the next meeting in July, so this will be a very time for the new committee.

So, with that, thank you. No action required on that report.

We next turn to the two new subcommittees. So, we've adopted two final reports, so now we're going to create two new

subcommittees. And Gerry is going to present the scope of work document for the Unlicensed Subcommittee.

MR. SALEMME: Thank you, Bryan. We have a draft scope of work that should have been included in the packets, and it really is a first draft. We have some information and some feedback from Michael, Bryan and a few others. But it's really an effort to build on what NTIA and the FCC has done with the allocation of spectrum for both licensed and unlicensed service in a fashion that is really to optimize spectrum efficiency, consumer benefits, U.S. productivity and market competition.

So, specifically the scope of work plans to: Examine past spectrum allocations, technologies and practices in the U.S. and internationally; to study available related research and interview experts in government and industry; to answer the questions that the scope of work tees up about the different

technologies; what's the most appropriate; how do you ensure that you have a service that is able to be used both by multiple users and targeted areas and in wide areas; what are the right technologies that are best suited for unlicensed allocations; to recommend rules and power levels that really work within a band; and, to be able to, I think, build on a lot of the work that's being done in the other subcommittees. Because there's always interdependence on these and hopefully we'll be able to look at that and build on some of the final reports and the ongoing studies.

You know, finally we tried to tie back to the National Broadband Plan. The Broadband Plan is recommending 500 megahertz of spectrum to be utilized. And the question is how much of that spectrum do we recommend, or does the subcommittee recommend, or this group recommend for unlicensed services and technologies?

So, as a first step we want to

look at it, look at the benefits, look at the costs and make a determination as best we can from the available information to come up with a recommendation on that. And the proposal would be to have a subcommittee selected as quickly as possible so we can get the meeting started, get more feedback, have a final work plan available by the end of the month. So, June 1st have something ready, begin the full set of meetings and have a first draft by August and then a final report by September. And that would be the objective.

And I'm desperate for more assistance. And, you know, since everybody's freed up and all the controversial issues are dealt with with regard to inventory, I presume we can find some trouble makers.

CO-CHAIR TRAMONT: So, in light of that very compelling presentation, a show of hands for folks who would like to work with Gerry? Any volunteers at the moment who want to take on this subcommittee? Oh, nice. All

right. A little competitive. Sure, we'll volunteer on the -- all right. Very well, Gary. Go ahead. Have at it.

So, Gary will now present the Sharing Subcommittee's scope of work and then we'll have a showdown on the scopes of work.

MR. EPSTEIN: I really too will be extremely brief on this, because we're just getting starting, and we happens to be me so far.

You heard the word sharing mentioned only; and I was counting, approximately 962 times in the last couple of hours. And in some sense I think the mandate of the Sharing Subcommittee will be to take the good work of all of the other subcommittees and try to synthesize it and come out with a -- incentives apply, all of the dynamic interference stuff applies, transparency applies. And so, I think sharing is maybe one of our ultimate end goals and may be a good thing to be able to recommend to

NTIA and the administration on some specific recommendations on sharing.

The work plan is very general because we don't really have a subcommittee yet, and it's based upon the fact that about a week ago I desperately called Bryan and Dale and I said what should be in the scope of work? And so far it's very general. It seemed to me the very first thing that we need to do is really define what we mean by sharing.

Some of it's pretty obvious. As a matter of fact, July mentioned it. He talked about geographic sharing and time division and dynamic spectrum, but it could be a lot broader. What about infrastructure sharing? Is that part of sharing? And what even the concept in the Broadband Plan of broadcast spectrum? Is that sharing or reallocation? I don't know. And so, a really important part of I think the first task of this subcommittee will be to define a taxonomy of sharing. What

do mean?

And the second thing I thought we would need to do is, okay, we got a lot of expertise in this group. Let's not reinvent the wheel. Let's figure out what are some of the examples out there that really worked in the past. And let's figure out if there's a difference between sharing between government agencies or sharing between government agencies and commercial entities. And of course, what do you do about public safety entities when you're talking about commercial and public safety entities? So, we would be looking for particular examples which would provide a good way to analyze what sharing works and what doesn't.

And then ultimately we really do want to come out with specific recommendations.

The schedule that Gerry mentioned I think would really be the same schedule for this subcommittee. I think we're moving

towards the same.

And we don't want to reinvent the world again. I looked over a little bit of the prior CSMAC; or I think as Bryan is trying to make us say CSMAC, work in the past and I think there's some good work there. There's good work with respect to the reports that have been produced by this particular group. And I think we need to look at the literature that's out there and need to draw on the expertise of committee members and interview and get involved with government, academic and commercial entities.

And so, that's really where we are right now.

CO-CHAIR TRAMONT: Great. So, volunteers for -- where should we start -- for Gerry's committee? Anybody ready? Marty's in, Jennifer, Michael, David.

And anyone on the phone, unlicensed?

(No audible response.)

CO-CHAIR TRAMONT: Hearing none. All right. I think we can start volunteering people in their absence.

And for Gary's committee? Excellent. Oh, wow. I'm going to read these for the record. Mark, Juli, double Mark, Darrin, David. All the cool kids are doing it. David and Marty and Bob. I'm sorry. Some of the cool kids are doing it. Sorry. At any rate, we have a robust --

MR. EPSTEIN: Can I get a list at some point?

CO-CHAIR TRAMONT: Yes, and I read it. Hopefully it will be part of the record and Joe and others will correlate that and send it around. And also, we do have a number of committee members who were not able to be here today, so we will obviously open up membership for them as well so that we will have even larger subgroups working on those two things.

All right. With that, thank you

both very much for agreeing to co-chair committees for the coming term. This is no easy undertaking, so we appreciate it very much.

All right. So with that, we will open it up for public comment. Jim Snider and then I know -- I think you need a microphone. I think that's the only particular requirement on where you are.

MR. SNIDER: Jim Snider from iSolon.org. I'd like this committee to consider the incentives that may discourage public participation in this meeting. I think my comments very much consist with the Obama administration's Open Government Directive and the NTIA's commitment to those principles and this committee's also commitment to the principle of transparent government.

So, five quick observations. A meeting time posted on the Federal Register was 9:30, which is the reference people are told to go to find out when this meeting

meets. The agenda posted shortly before the meeting was 9:00. So, if you came at the official posted time, you would have missed -- a minor point.

Video. There's a listing on the Web site for three videos for the three past meetings. The first one, when you click on it, looks like there's a link, doesn't work. And the other two have no video. I'm interested in watching these meetings from my office and not coming in. The lack of trust and time, video and other things, is a serious problem. I hope you will address that problem.

The transcript. The transcript looks great. No spelling errors. The grammar is decent. But the actual quality of the transcript seems to be awful. I'm just curious. How many people here have read the transcripts? Okay. Lots of problems. I would recommend that you either consult with the company and get them to improve the

quality of the transcripts or you find another transcript company. They're very expensive. I think maybe you should get your money's worth. That's also part of transparency. If we don't have a reliable transcript, what's the point?

Minutes. They're consistently late posted on the Web site. I believe there's one that's close to a year old with no minutes. That's your official record. I think under FACA you're obligated to do that; I could be wrong. But whatever it is, if you want to be transparent, you got to get your minutes up. You've got to get them up there in a reasonably timely fashion.

Public notice. Citizens are told to go to the Federal Register, which is an incredibly inconvenient thing to do to find out when, because these things don't -- meetings meet periodically. Find out. They have no email notification of the Federal Register. At the last meeting I think it was

posted on your Web site within 24 hours of the meeting and no notice even of when it was actually posted. This time it was posted in a timely way. It was posted basically at the time in the Federal Register. That is incredibly inconvenient to force members of the public to constantly be checking at the Web site to find out when your next meeting is. You should have an email list. I've requested for more than six months to be put on an email list so I don't have to go look at the Web site. This is obvious. It's a simple thing to do. I would go even further. I would like to receive all notices that all the members here get. I don't think that's going to happen, but I do think that's actually quite consistent with the Open Government Directive. But at a minimum I should have easy access to email notifications of these meetings so I don't have to go through that hassle.

And lastly, I was disappointed

with the committee's decision that standards of academic integrity would not be a priority if they were inconvenient for the committee. I don't think that's necessarily unusual for government advisory committees, but this is an expert advisory committee and I would encourage you to rethink the relevance of standards of academic integrity to your work. I think it's an important value and again I would encourage you to rethink that stand. Thank you.

CO-CHAIR TRAMONT: Thank you for your contributions. We're going to take that under advisement. There's a number of things that I feel like we can be responsive to working with our colleagues at NTIA to be more transparent to the public and make your job easier in participating in our proceedings. So, obviously that's very important to us.

In that vein, Mr. Marcus, I know that you had a presentation. And we have some handouts we're passing now.

MR. MARCUS: Thank you. Five minutes is a reasonable time?

CO-CHAIR TRAMONT: That would be great.

MR. MARCUS: Great. Okay. I have a handout here. It's widely known that federal spectrum is used very widely in space and in time and there's great potential for increased civil spectrum use if it can be on a non-interference basis. The key thing is that civil spectrum use not only increases the civil communication industry, the manufacturers and the carriers, efficient wireless communication helps the whole GDP. And the European Commission has made quite clear that efficient communication is very important for economic growth, not just for the corporations that are referenced in this room.

Since what's good for the GDP is also good for the national security community, because the IRAC membership in the national

security community uses of four to six percent of GDP and the only way we can afford to spend money on national security is to keep the GDP growing, because congress seems to be unwilling to keep its expenditures beyond the four to six percent point. Thoughtful spectrum sharing will improve GDP and national security.

Now, the realistically passive sensing of federal spectrum for sharing isn't going to work. Why? Because most spectrum decisions of federal government are realistically made by the IRAC, not by the NTIA staff. That's a pragmatic observation from 25 years in inspector management. And there's no incentive for the IRAC members to do this given the risks that they see associated with it and the lack of economic gain.

The point I've been trying to make here and the presentation I went for a previous meeting was if you rely on passive

sensing, if you look at the graph there, the fraction of usable spectrum that can be used is going to be negligible if you insist upon zero chance of interference. Much more constructive is inter-system cooperation that is not possible with present systems which were not designed with sharing in mind. If you look at the five megahertz dynamic frequency sharing, it's the best that could be done with a system that wasn't designed for sharing. It's really a crummy system. A few of the false alarm rates are much too high unless you come up with very, very liberal interpretations of what is now a treaty obligation of the United States.

So, the key issue is can we get federal users to design systems that facilitate sharing? For example, in LAN mobile trunk systems along the lines of the original D Block Sharing Proposal, which failed not because it was a bad technical idea; it failed because the business aspects

of that NPRM were atrocious and made you wonder did anyone with an MBA ever read the NPRM before it was issued, but also with RADAR systems. And all due respect to Mr. Reaser, a key issue of RADAR systems is most RADAR systems rotate. And when they rotate, they point this way, they point that way. Not all RADAR systems. Most RADARs systems rotate.

And I was involved on the Friends of the XM-Sirius Merger, and the thing that fascinated me about that was the sudden realization was XM-Sirius does not have 1,000 millisecond per second access to that spectrum. Why? You go under underpasses. And yet if you have XM-Sirius in your car, it works. You don't notice that little detail. But growth for spectrum demand these days is not for two-way real time voice. The growth for spectrum demand is in packetized data, usually one way. But generally, packetized data, in using intermittent available spectrum, one can provide useful services of

packetized data. And therefore, I believe strongly that you can design new types of RADAR systems; not existing RADAR systems, new types of RADAR systems to share with users on an intermittent basis taking advantage of rotation intervals. And I think this should be a high priority of the committee.

Now, it was said previously that harmful interference is something we don't want to go into. Let me disagree with that. If you read Title 3 carefully, five different places in Title 3 the word "harmful interference" is mentioned. Whether that's a good idea or not, I won't say, but congress has incorporated it in Title 3 in five different places, usually dealing with federal/non-federal sharing or reallocations. So, it's key what really is harmful interference. And I'd like to remind the committee that the IEEE USA sent a letter to both Assistant Secretary Strickling and Chairman Genachowski two weeks ago; NTIA has

a copy; you can also look on my Web site on my blog to find a copy, saying how important it is to clarify, not define, clarify what is harmful interference.

Because let's assume the inventory gets done tomorrow. Let's assume we have a huge stack of paper here that lists every transmitter in the United States, their technical characteristics, the exact minutes and seconds they turn on each day and their location. What would you do with that information? I would argue as a veteran of both the AWS-3 proceeding and the Northpoint proceeding 10 years ago that if we knew where every transmitter in this country was, and had complete information; which we will not in any case, we would just trigger dozens of AWS-3 and Northpoint decisions that will keep the industry tied up in knots for years and result in no access to spectrum. So, some sort of clarification and faster adjudication of harmful interference issues is critical for

translating inventory into real spectrum. Thank you.

CO-CHAIR TRAMONT: Great. Thank you very much and we'll incorporate your submission into the record, and I think it has some informative points for some of the subcommittees' work going forward.

Other public comment?

(No audible response.)

CO-CHAIR TRAMONT: Okay. Seeing none. We are almost prepared to go to calendars to figure out our next date; we're not quite there yet. So, we're going to work with Assistant Secretary Strickling and come up with some proposed dates and circulate those. We are shooting for July. We'll try and see what we can do in light of people's vacation schedules and other issues, but we're shooting for July/August and then obviously another meeting in the fall. So, we will send those around forthwith.

Dale, anything else?

CO-CHAIR HATFIELD: No.

CO-CHAIR TRAMONT: Anything else for the good of the order from the committee?

(No audible response.)

CO-CHAIR TRAMONT: All right. Thank you all very much. We're adjourned.

CO-CHAIR HATFIELD: Good job. Thank you.

(Whereupon, the above-entitled matter was adjourned at 12:17 p.m.)

G