**DEPARTMENT OF COMMERCE**

**+ + + + +**

**COMMERCE SPECTRUM MANAGEMENT**

**ADVISORY COMMITTEE**

**+ + + + +**

**MEETING**

**+ + + + +**

**WEDNESDAY**

**JUNE 8, 2016**

**+ + + + +**

**The Commerce Spectrum Management Advisory Committee met in the offices of Wilkinson Barker Knauer, LLP, Suite 800N, 1800 M Street NW, Washington, D.C., at 1:00 p.m., Larry Alder and H. Mark Gibson, Co-Chairs, presiding.**

**MEMBERS PRESENT**

**LARRY ALDER, Co-Chair**

**H. MARK GIBSON, Co-Chair**

**MICHAEL A. CALABRESE**

**MICHAEL S. CHARTIER**

**MARK E. CROSBY**

**THOMAS S. DOMBROWSKY, JR.**

**HAROLD FURCHTGOTT-ROTH**

**PAUL J. KOLODZY**

**ROBERT KUBIK***

**MARK A. MCHENRY**

**ROBERT PEPPER**

**CARL POVELITES**

**CHARLA RATH**

**RICHARD L. REASER, JR.**

**JEFFREY H. REED**

**DENNIS A. ROBERSON**

**KURT SCHAUBACH**

**STEVE SHARKEY**

**MARIAM SOROND**

**BRYAN TRAMONT**

**JENNIFER WARREN**

**ALSO PRESENT**

**PAIGE ATKINS, Associate Administrator, Office of Spectrum Management, NTIA**
**COLIN ALBERTS, Senior Counsel, FTI**
**PAUL ANUSZKIEWICZ, Vice President, Spectrum Planning, CTIA**
**SIDD CHENUMOLU, Director, Technology Development, Dish Network**
**WANDA COVINGTON-RAGSDALE, Telecommunications Specialist, Office of Spectrum Management, NTIA**
**BOB DENNY, Electronics Engineer, Office of Spectrum Management, NTIA**
**REBECCA DORCH, Senior Spectrum Policy Analyst, Institute for Telecommunication Sciences, NTIA**
**DAVID J. REED, Chief, Spectrum Affairs and Information Division, Office of Spectrum Management, NTIA**
**DEREK KHLOPIN, Senior Advisor for Spectrum, Office of the Assistant Secretary, NTIA**
**JON MOAK, Telecommunications Specialist, Office of Spectrum Management, NTIA**
**STEVE MOLINA, Deputy Associate Administrator, Spectrum Planning and Policy, Office of Spectrum Management, NTIA**
**RICH ORSULAK, Engineer and Telecommunications Specialist, Office of Spectrum Management, NTIA**
**GLENN REYNOLDS, Chief of Staff, Office of the Assistant Secretary, NTIA**
**ERIC ROSENBERG, Telecommunications Specialist, Office of Spectrum Management, NTIA**
**BRUCE WASHINGTON, Chief of Staff, Office of Spectrum Management, NTIA**

*** present by telephone**

A-G-E-N-D-A

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

1:00 p.m.

CO-CHAIR ALDER: All right. Welcome, everyone, to the CSMAC meeting. So we've got a full agenda this week.

But before we get into all of the details of the agenda we'll have our opening remarks by -- standing in for Larry Strickling here is Glenn Reynolds, chief of staff. So Glenn, why don't you take it away.

MR. REYNOLDS: Thanks, Larry. I get the opportunity and the honor of channeling Larry I think for the second time before this group. He sends his regards and his regrets for not being able to make it here today. He got called away at the last moment.

For those of you who know Larry you know there's nothing he enjoys more than digging into the weeds of difficult problems and so he would prefer to be here. But hopefully we can continue to work in his absence. And he'll be in attendance for what presumably would be his last

CSMAC meeting in August.

First of all, thanks to Bryan and to Wilkinson Barker for hosting us in their garage which I guess is a bit of an homage to the Silicon Valley startup world.

But I also want to thank everybody that's here and all of the CSMAC members who are not here for their work and the recommendations you all are working on and continue to provide support to NTIA.

While we are certainly entering the home stretch on behalf of the administration there is no doubt that spectrum will remain a highly visible and bipartisan issue regardless of who comes in for the next administration. CSMAC thus will remain a vital component to NTIA's ongoing efforts and the current work will be an important resource for policy-makers well beyond this year.

It is no secret to anyone in this room that spectrum has become critically important to our economy, to the people of this country and to

the important government missions that all of the agencies are serving.

While this was certainly true before this administration, as we at NTIA look back over the past seven years it seems as if this issue as a national policy priority has come out right in front of our very eyes.

Today spectrum use permeates our daily lives even if most of the users don't think of it on a daily basis.

Indeed, wireless and mobility have become elements of the digital economy and keeping the U.S. at the forefront of the emerging technology and development and adoption is a fact that is being repeatedly acknowledged by the President and indeed by my boss's boss Secretary of Commerce Penny Pritzker.

Moreover, new uses for wireless communications continue to emerge in many ways tied to the emerging internet of things.

Spectrum requirements for IMT are going to be extensive and they're going to be

diverse because the applications that will be using them will be diverse. Smart cities, autonomous vehicles, UAS and so on.

To empower this evolution we know the industry is very focused on 5G technologies. And we at NTIA and the administration generally are working hard to support those objectives.

We also see government at the federal, state and local levels seeking new spectrum in new and exciting ways. Yes, sometimes piggybacking on commercial technology developments such as with FirstNet and LTE, but in even more cases to meet unique missions that participants in the commercial sector undoubtedly are not focused on.

We have to accommodate all of these diverse interests requirements in these cases. It requires hard work but is a fascinating effort that all of you are contributing to.

We continue to believe that this forum is a crucial resource for NTIA to be able to draw upon to help us look at and ultimately address

some of these really important challenges and opportunities.

So I want to thank you again for your hard work here at CSMAC and the recommendations you are working to provide to NTIA.

We look forward to hearing those recommendations today and starting on a new term in the fall. Your input at this meeting and the next one on the possible continuation of existing work or proposed new questions will be extremely helpful in developing the way forward for this next session.

A couple of quick business notes. First, we want to let everyone know that the applications for nominations for the next two-year membership term which will start this fall have been received by NTIA.

After an initial review we've decided to reopen the application window for nominations as we seek to expand the pool of applicants and thus ensure that the composition of the committee reflects balanced points of view.

As always we are looking for a balanced cross-section of interests in spectrum management and policy including non-federal spectrum users, state, regional, or local sectors, technology developers and manufacturers, academia, civil society and service providers with customers in both domestic and international markets.

We have very strong candidates to consider and we'll have to make some very difficult decisions, but I'm convinced that the CSMAC will continue to have a very strong and diverse membership that is more than capable of addressing the challenging questions we have put before the committee.

Second, I want to recognize a recent addition to our NTIA team. Rebecca Dorch who is back in the corner there. Many of you all may know Rebecca from her past 10 years as the head of the FCC's Western Regional Office, and before that as an advisor within the FCC's headquarters offices on policy issues.

She has just recently joined NTIA as a senior spectrum policy advisor to the head of our Institute for Telecommunications Sciences out in Boulder helping Keith Gremban organize the policy choices and just basically running the shop out there.

Among the things she's been working on is helping to pull together the next ISART meeting which is going to be held the first week of August in conjunction with the next meeting of the CSMAC.

And as she has preempted me, I was about to say I note that she has brought a number of registration information pamphlets about ISART. And hopefully we will see many of you guys in Boulder both for CSMAC and then staying on for the next couple of days for the ISART conference.

And with that I'm going to hand it back over to Mark and Larry.

CO-CHAIR ALDER: All right, thank you. Thanks, Glenn.

So, before we get into the roll call just a few openings comments about where we are. First again, thanks Bryan. Bryan, do you have any announcements about facilities that you want to make?

MEMBER TRAMONT: I think everybody's been here before, but if not the kitchen's across the hall this way, the restroom is through the lobby in the back door there. I think that's it.

CO-CHAIR ALDER: Thanks, Bryan. So, as you know we're in kind of the home stretch of this CSMAC.

I want to thank everyone. I've seen a lot of productive work. We've all seen a lot of productive work culminating in this meeting. I think we have five robust presentations with recommendations to consider.

Hopefully, the plan is we'll debate those and bring a lot of those for a vote today.

We'll then progress towards the final CSMAC meeting for this group which will be August 1 in Boulder.

The plan there is twofold. One is to finish up any unfinished business from today that we can't get done today.

What we'll do is also ask for any additional material. Some of the groups I know have reports in addition to the recommendations. That all gets turned in and submitted.

We'll also at that point -- we're asking that all the recommendations and reports get in by July 15. I think David sent an email to that effect.

And what will happen then is that will give time for the NTIA to react and in the August meeting also provide feedback on the work that's been done. So the goal will be to wrap this up by the 15th of July and then on August 1 there will be feedback.

In addition to that what we're going to do is collect suggestions for future work. So what we're going to ask is that people submit their suggestions either through the existing committee co-chairs or directly.

You can send an email to Mark, myself, and I think cc'ing Dave and Paige is the right approach.

What we'll do is we'll collect all that input, digest it somehow and have that also as a topic of discussion on August 1. So a lot to happen between now and August 1.

Let me ask is there any questions on that timeline and where we're at?

MEMBER DOMBROWSKY: Same deadline for submissions?

CO-CHAIR ALDER: Yes, we didn't really think of a deadline for the suggestions, but that sounds like a good one.

Okay. So with that let's go ahead and we'll do a roll call. We'll just head around the room and do introductions. Tom, do you want to start?

MEMBER DOMBROWSKY: Tom Dombrowsky, Wiley Rein.

MEMBER SCHAUBACH: Kurt Schaubach, Federated Wireless.

MEMBER SOROND: Mariam Sorond, Dish Network.

MEMBER ROBERSON: Dennis Roberson, IIT and Roberson & Associates.

MEMBER REASER: Rick Reaser, Raytheon.

MEMBER SHARKEY: Steve Sharkey, T-Mobile.

MEMBER MCHENRY: Mark McHenry of Shared Spectrum Company.

MEMBER POVELITES: Carl Povelites, AT&T.

MEMBER KOLODZY: Paul Kolodzy, independent.

MEMBER FURCHTGOTT-ROTH: Harold Furchtgott-Roth, Furchtgott-Roth Economic Enterprises.

MEMBER CROSBY: Mark Crosby, EWA.

MEMBER CHARTIER: Mike Chartier, Intel.

MEMBER PEPPER: Robert Pepper, Aspen Institute.

MEMBER RATH: Charla Rath, Verizon.

MEMBER REED: Jeff Reed, Virginia Tech.

MEMBER WARREN: Jennifer Warren.

MEMBER TRAMONT: And Bryan Tramont of Wilkinson Barker.

MS. ATKINS: Paige Atkins.

CO-CHAIR GIBSON: Mark Gibson, Comsearch. I just want to say that the microphones are on so I don't think you have to push anything. You can do that, we'll laugh at you, but you don't have to push them.

CO-CHAIR ALDER: Larry Alder with Google.

MR. REYNOLDS: And Glenn Reynolds with NTIA.

CO-CHAIR ALDER: How about on the phone? Do we have any CSMAC members on the phone?

MEMBER KUBIK: Rob Kubik.

CO-CHAIR ALDER: Could you say that again? I didn't quite hear that.

MEMBER KUBIK: Rob Kubik, Samsung.

CO-CHAIR ALDER: Any other members on the phone? Shall we go around the outside of the room?

MR. REED: Dave Reed, NTIA.

MS. COVINGTON-RAGSDALE: Wanda Covington-Ragsdale, NTIA.

MR. ANUSZKIEWICZ: Paul Anuszkiewicz, CTIA.

MR. ALBERTS: Colin Alberts, FTI.

MS. DORCH: Rebecca Dorch, NTIA ITS.

MR. ROSENBERG: Eric Rosenberg, NTIA.

MR. MOAK: Jon Moak, NTIA.

MR. ORSULAK: Rich Orsulak, NTIA.

MR. WASHINGTON: Bruce Washington, NTIA.

MR. LESLEY: Jeff Lesley, NTIA.

MR. DENNY: Bob Denny, NTIA.

MEMBER MCHENRY: Sidd Chenumolu, Dish Network.

CO-CHAIR ALDER: Any other guests on the phone?

I just wanted to mention, Mark and I

both wanted to mention that unfortunately I think many saw the email that Dale's wife had a fall, injured her hip. And so he's unable to attend. I think his wife's health is all on our minds and we hope she gets better quickly.

So with that I think that's our opening comments. And so now we'll turn the page for our spectrum update.

MS. ATKINS: Thank you. So we're going to spend most of our time today discussing the recommendations that are before us. That will be the most important topic.

But I think it's always helpful to hear about our activities, accomplishments and priorities that help shape that discussion and debate.

I also have often said that we need to look at our spectrum challenges through different lanes. And I'm hoping today that I'll not only give you my normal spectrum update, but perhaps seed some ideas that help us look at our challenges and opportunities in a different way

and perhaps think of new and innovative solutions that can help us fully exploit those opportunities ahead of us.

So first I'll highlight a few things that have occurred since our last CSMAC meeting in March.

Chairman Wheeler and Assistant Secretary Strickling met in early April for their normal biannual session to discuss spectrum planning and management priorities demonstrating the Commission and NTIA's commitment to work collaboratively in all of the areas that we're discussing here and that I'll mention this morning.

They discussed the FCC and NTIA's collective work to identify and prioritize opportunities to increase spectrum availability including for 5G as well as other federal innovative uses.

In an important example of this collaboration both affirmed the continued commitment toward achieving the 500 MHZ

President's goal of additional spectrum being made available for wireless broadband by the year 2020.

And as all of you know here we're about halfway to that target. That does not include the ongoing incentive auction which we're very excited about. And we are definitely on target to meet the goal by 2020.

With the FCC and our agency partners along with members of the industry we continue to evaluate the feasibility of increased sharing in other bands including with unlicensed devices in 5 GHz. And there are two bands we're focused on, 5350 to 5470 MHZ, and 5850 to 5925 MHZ.

And we continue to make progress to include a robust discussion on 5.9 GHZ at a stakeholders meeting in March for those of you who participated.

And most recently the FCC's release of a public notice to refresh the record in that band.

We also have intensified our efforts

in 5350 to 5470 MHZ working with the agencies and industry to establish accepted system parameters and modeling approaches that will help us determine if sharing is technically feasible in that band.

NTIA is also performing some baseline simulations which will be used domestically and internationally in the coming months. And folks will remember that these 5 GHZ bands are also being looked at for 19.

As Larry has mentioned before we are very optimistic that later this year in consultation with the agencies we'll be able to lay out a roadmap of how we're going to achieve the 500 MHZ goal.

The SEC working in collaboration with NTIA and the DoD is in the process of reviewing the first wave of spectrum access system administrator and environmental sensing capability operator applicants as part of the compliance process for the Citizens Broadband Radio Service devices operating in the 3.5 GHZ

band.

We continue to work with the Commission and DoD to define the SAS and ESC certification requirements and processes that will enable implementation. And we think those will be critical as do SEC and DoD.

And we remain very excited about the potential 3.5 GHZ to not only enable new commercial services, but really to help us throw out approaches and technologies that could be applied to other bands as well.

And as collectively we expand our vision to include retired bands above 24 GHZ primarily in the millimeter wave region. For example, for 5G, predominantly for 5G.

Chairman Wheeler stated that the Commission will adopt a report this summer in the Spectrum Frontiers proceeding. I believe specifically in July.

And in addition to this significant step forward the FCC working with NTIA will continue to explore new opportunities to make

additional millimeter wave bands available and explore sharing mechanisms between federal and non-federal users as part of the further notice of proposed rulemaking.

The Chairman is working on an aggressive timeline and NTIA fully supports his goals and to further our U.S. leadership in the 5G arena.

We will also continue to work our global effort as I mentioned earlier which are extremely important.

And it is our hope to maximize global harmonization in these bands as appropriate and as makes sense.

And that will help us continue to not only demonstrate U.S. leadership, but also gain the economies of scale which are helpful not only to industry but as well to the consumers.

It remains no surprise that Congress continues to be actively engaged with spectrum issues.

Bills in different stages of maturity

and consideration include the Mobile Now Act, the Spectrum Challenge Prize Act and the Private Spectrum Relocation Funding Act of 2016.

While we believe that our current spectrum management processes are working quite well, we always keep an open mind regarding ideas on how we can do things better.

Last but not least, and don't think I'm too close to the end, I would like to highlight the latest wireless spectrum R&D or wizard workshop on enforcement that was held in May, about a month ago. And several of you I know also attended.

We talked about many of the enforcement challenges that CSMAC has tackled especially over the last couple of years.

And I will paraphrase Janice. Is Janice here? Well, I will paraphrase Janice from one of our CSMAC meetings last year, "Without enforcement nothing else matters."

And as we move to a much more dynamic sharing environment, especially between federal

and non-federal users, we need to establish a foundation that allows us to evolve from where we are today which is very reactive and static to where we need to be in the future which is much more proactive and automated.

And we need to leverage opportunities to build in enforcement from the start versus bolting it on afterward. And that will give us a huge advantage in the future.

Now, after wizard I used a cyber analogy and I think it bears repeating today. And this is the seed ideas.

If you look at NIST's cybersecurity framework, and I'm not sure if anyone's familiar with it, but the framework core consists of five concurrent and continuous functions - identify, protect, detect, respond and recover.

And so fundamentally you think of it as identifying the context. What assets do you have, for what business purposes and at what risk.

Then better protecting those systems.

In our case from interference in the first place.

Effectively detecting that something is happening, where it's coming from and who's doing it.

Mitigating or preventing impacts from occurring.

And then when needed restoring capability that was lost or impaired. You can't adequately provide for cybersecurity without all of those elements, and they're enabled by technology, particularly in terms of near realtime and realtime capability.

And then the policies and processes to effectively leverage and apply that technology. And there are some unique challenges with cyber as there are with spectrum.

So likewise, the same applies to our spectrum enforcement as well as just our ability to share more dynamically and successfully in the future.

So it's a solid analogy I think and construct that we can learn from and perhaps

reapply in a different way.

There are many other cyber analogies, such as how do we better share information. I know it's of particular interest to many of you.

And how do we correlate and digest large amounts of information quickly to address the current and future challenges we face. Big data which will be a topic of ISART as well.

Some cyber models may be useful and applicable to the spectrum management and policy world.

In addition to the cyber framework that I described which I think is very applicable information-sharing is a key pillar of effective cybersecurity.

And I'll give you some examples. In the cyber world you've got the information-sharing and analysis centers, the ISTACs.

The National Council of ISTACs helps coordinate across the sectors.

The National Cybersecurity and Communications Integration Center which is more

operationally focused but includes not only government entities but industry members that are supporting these critical functions.

And within the NCCIC, the National Cybersecurity and Communications Integration Center, the cyber information-sharing and collaboration program.

And the latter is considered DHS's flagship program for public-private information-sharing.

And all of these efforts really are geared toward information-sharing among industry, among non-government players as well as between non-government and government entities.

Not all these approaches or constructs will be directly applicable to the spectrum challenges we face, but I encourage us to think of these kinds of analogies that are relevant, that we can learn from and that can help us look at these challenges and opportunities in new and different ways. So I encourage you to do that.

And I really look forward to the

discussion today on innovation. I hope that we can finalize most if not all of them, though I understand we may be a little shy on some.

And then as Larry mentioned that will allow us to address some feedback in August. It probably won't be quite as robust as the last feedback on the last set of recommendations since we'll have limited time to digest the recommendations and what we can potentially do in response.

We will do that during our final meeting. And as Glenn mentioned this will be in conjunction with the ISART and I do hope that everybody takes maximum advantage while you're out there to participate in the conference as well as the CSMAC meeting.

And I'll extend the cyber analogy here. So the ISART, and I don't think Glenn mentioned the topic is spectrum forensics. So spectrum measurements that support interference monitoring, investigation and enforcement.

So again, much closer to the cyber

analogy than other areas. More information may also be found at the ITS website on the symposium.

And with that I'm going to turn it back, or I'll offer up if anybody has any questions.

CO-CHAIR ALDER: Questions for Paige?

MS. ATKINS: I'm not sure I've ever said anything that didn't result in a question.

MEMBER CHARTIER: Could you send us the link to those of us who were not at the wizard meeting?

I think the cyber analogy is really powerful. So could you send us -- to the group a link to the cyber framework?

MS. ATKINS: I will send a link to the cyber framework. That's on the NIST site.

But there's also -- I'll point you to the wizard webcast because that's posted as well. So you can also listen to the discussion.

CO-CHAIR ALDER: Other questions for Paige? All right, Mark, why don't you take us

over and walk us through.

CO-CHAIR GIBSON: Okay. Thanks, Larry. Just to be redundant please speak into the microphone. You don't have to press any buttons.

And also remember to announce your name when you speak. And I'll try to if you don't do that because again the transcript is being done. So I'm just going to read that as a standard thing from now on.

Okay, so, the top of the list. Oh, and the other thing is we have a fair amount of time for this but there's no need to be loquacious, you know. So, I mean, unless you have something to say. No, I'm just kidding.

What we're going to try to do is get through these recommendations. And to the extent feasible please provide clarity around them. You don't need to read them because all of us are literate here.

But I mean, what Paige and her team are going to need is detail you feel you can

provide as you read these out so they can deliberate on them.

I'd also like to take a moment and say thanks to all the NTIA people that have been participating in the calls. It's a lot of work, we realize that, and thank you all for the work you do. It really adds a lot of help and a lot of dimension so thank you again.

So with that the first one, Charla. I think Audrey is not with us so it's bi-directional sharing.

MEMBER RATH: Great, thanks. And I just echo the sentiment that Mark just said about the help that we've been getting from NTIA. We really appreciate the support. And also to my subcommittee members.

As Mark said there's no need to read everything to you. And in fact, three of our recommendations were made at the last CSMAC and they're nearly identical. And I just want to go through what some of the differences are.

And just as a reminder to sort of step

back you can look on the first couple of pages, you can see we had a very big question that was put before us.

But one of the things that we asked NTIA to do even before the specific question came to us was actually give us use cases. Because the sense was that would help us focus on really trying to learn what were the reasons and what were the issues behind a federal user needing or requiring access to non-federal spectrum.

So, as a reminder what we did is we split the use cases that we got into two different areas, several that were clearly very involved with public safety issues, and then one that was specific to DoD.

What we did the last time is we actually shared with you the recommendations that were specific to the public safety recommendations.

As it's really turned out and as we've looked at them really all four of them are recommendations that apply to all of the use

cases. But they were really developed separately.

The first two, as I said the first two are nearly identical. They're just there to help keep us on point, making sure that we were recommending to NTIA that NTIA should be doing some things. So we sort of moved a little bit of it around, particularly the second recommendation where it suggests that NTIA develop and maintain a database, but in the alternative the FCC might do it. But either regard you've got to coordinate. So those two are basically the same.

The third recommendation was initially a recommendation that came out of the work that we had done with the public safety community. And it seemed like there was just this sort of open question did it ever make sense for -- and this is how it was written the last time, did it ever make sense for a federal user to actually have a license as opposed to doing it through the process that it tends to be done through now which is through a memorandum of understanding

where you would then get an assignment for that frequency even though it was considered a quote unquote "non-federal frequency."

When we went back to the table and talked it through there was just some discussion about, first off, maybe we should ask it both ways. You know, is there ever an opportunity for a non-federal user to get a direct assignment from -- at that point we were talking NTIA versus the FCC.

And then we searched it back even further and said well, let's not even talk about who's giving the assignment. It's just sort of a discussion of is there ever a reason for a non-federal user to have a specific notation that they have access to federal spectrum.

So we really just posed the question. We didn't answer it. We just thought maybe it's an interesting one for further exploration.

I know, and this is just personal experience with having dealt with this issue over the course of a few years. I won't say how many.

But we have looked at this specific issue before of just how difficult it is to get around things that are in the Communications Act about who gets to assign for a license.

So it's -- I think in a way a part of what we were trying to do is step back from that and see if there are ways to actually give direct authorization without actually getting into the nitty-gritty.

So before we move to the fourth recommendation since that was one where there was a fair amount of both general discussion as well as some offline discussion I'm going to open it up and see if anyone else on the subcommittee, if I said it clearly enough. I'm looking at Jennifer. Are we good? Are we good? Okay.

Any other comments too Mark since this was again, I said it the last time, I'll say it again. Mark actually really took the lead on the public safety side of this.

And just to remind people where we came out which was quite interesting is that

there were a large number of cases where some of the community just didn't even know what was available to them. So it seems like a relatively simple thing to give in response to a fairly complicated question, but I was laughing because I wrote down transparency, communication. A lot of the things that you just said, Paige.

And I think that's a big piece of it is just to identify for federal agencies just what's available to them now and how they can take advantage of these things.

The last use case was one we touched on a little bit in the last meeting. And it was frankly, it was both more difficult and in some ways easier.

It was a very, the use case, the recommendation, it's hard to even call it a use case, but what DoD was asking was for primary allocation of spectrum at 2.1 which is the downlink portion in the AWS3 spectrum that was just auctioned about a year ago for $40 billion.

So it was a somewhat narrowly

fashioned request, but it still had a lot of things in it. Needless to say there were several people on the committee who felt a little bit uncomfortable with leaping directly into, yes, let's tell NTIA that they should make this recommendation.

And our view was we needed to step back and look at the issue. And we felt like we couldn't even make a recommendation for the FCC to do an NOI.

And to me what was most interesting about this is we had actually reached that conclusion before our last meeting with DoD.

I unfortunately wasn't able to attend that meeting but I saw some of the notes from it afterwards. And for me at least personally it really affirmed that there are a lot of different reasons that affect why a federal user does not have -- why they're not able to get access to non-federal spectrum.

And that it's really worth further exploration, and not necessarily in the context

of a regulatory proceeding.

So I mean, there was controversy about this one, but ultimately the group decided that what we would do is we'd recommend a workshop.

And we talked about not exploring, but addressing.

And one of the things that I wanted to mention here is that a lot of people were like oh you know, another workshop. That's going to get us nowhere.

First off, you mentioned wizard. And the wizard workshops do actually produce fairly detailed reports that the government has taken action on some aspects of it. And that's what they're meant to do. So I think that's a good model.

One of the models that I brought up was one that Dr. Pepper will remember, but an auction workshop that we did 20 years ago that Annenberg did in combination. I reminded Janice of this too, is that we did -- and it literally led to what the FCC adopted.

It was a group of these incredibly brilliant economists sitting in a room and they knocked out details of what needed to go into the auction, the early auctions.

And frankly, that is really -- when we were talking about it that's the kind of workshop we're seeking. That it's not just -- this is not just sort of a frivolous recommendation. This is from our point of view a very serious recommendation.

So, I'm not going to read it to you but you can read it. And I am actually going to open this up because again there was a fair amount of discussion on this and I just wanted to see if my subcommittee members, my colleagues had anything to say in addition.

Really? So, any questions on this?

MEMBER ROBERSON: Yes. One of the things that you pointed out, in fact a couple of times is the fact that the people don't know what's available to them today.

I was expecting based on that preamble

that there might be something in your recommendation that would be to document all of the existing.

MEMBER RATH: Actually, maybe I misspoke because I wasn't talking about what's available spectrum-wise specifically, although in some cases, Mark, I think it may be that piece.

But it's actually just the whole process too.

MEMBER ROBERSON: Well, I'm talking about the process, yes.

MEMBER RATH: Yes. And that was actually I thought implicit in the first recommendation because the process to share is not universally known. NTIA in coordination with the FCC should prepare a reference document that actually outlines it.

MEMBER ROBERSON: Okay.

MEMBER RATH: Yes, so that actually -- does that capture it for you?

Oh, the other thing I meant to mention is that we do -- I'm sorry, I forgot to mention

this. You probably should have.

We are actually going to produce a paper that goes into detail on our rationale for these various recommendations.

It's been drafted. It's actually in fairly good form at this point, but we just felt -- we made a decision last week as a committee that it was not ready to distribute to the full CSMAC. And we have made a promise that you will have it by the end of this month. I put July 1 because that was a Friday, but it will be distributed. We just have some work to do on it.

CO-CHAIR GIBSON: Any questions for Charla or comments? Okay.

CO-CHAIR ALDER: In your recommendation two you talked about a database of the existing agreements. Did you have a feeling for how many of these existing agreements?

MEMBER CHARTIER: More than a dozen. Mark Crosby. I think there's more than a handful. We really don't know because who is in the database, we don't know.

But I think just based on some of our conversations with -- the conference call we had awhile back with five or six of the federal agencies they all had like two or three, right? And then those were the ones they knew about. There may be others. So I think there's more than a handful. I think it's a meaningful number.

CO-CHAIR GIBSON: Okay. Thanks, Mark. Any other questions or comments? Rob, do you have anything? I'll take that as a no.

MEMBER TRAMONT: Thank you, Bryan Tramont. Our meeting with DoD also yielded an MOU template which will be attached to the report which we think is a helpful jumping off point towards some conversations.

MEMBER RATH: Yes, and Rich will also have a link to one at DHS as well.

MS. ATKINS: And that is related to my question. Will the report address what would be recommended in terms of elements to be included in the MOUS related to facilitating sharing?

MEMBER RATH: Yes, it's recommended and plus DoD is fine with us including the MOU.

MS. ATKINS: And then there was, as part of the original question we had on what options are available to incentivize licensees, exclusive use licensees to share with users.

Did you -- I know at one point one of the earlier meetings I think the answer was money, but I was wondering if you'd had a chance.

MEMBER RATH: It's funny, Paige, because as I was preparing for this I went back and I was looking at that.

And part of the reason that we didn't talk that much about that issue was because the use cases, the first set of public safety use cases we had really -- it didn't seem like it was about incentives as much as it was about information.

And the second, you know, I'm not sure whether anyone else would have anything to say about the discussion on the DoD point of view.

I mean, I think there are some

questions about incentives with auctioned spectrum being maybe different than other kinds of incentives because DoD, for example, did do agreements with the broadcaster auxiliary in the spectrum.

But in all fairness we didn't really address it and it was in part because we were led down a particular path because of the use cases.

But did anybody else want to comment on that?

MEMBER WARREN: Jennifer Warren. So no, I don't really think we had, as Charla said, any discussion about that because we were so caught up in the first question.

As was said any discussions about incentives was public safety fed, not the FCC licensees, the commercial licensees. But that might be a suggestion for further work.

But I did want to just raise one other issue if I could. And there was something here in the scope of the second recommendation that is interesting if everyone has a view on.

When we talked about developing a database of MOUS there's a parens around the pending MOUS.

And I think one of our questions internally that we didn't really resolve is when does a pending MOU become relevant to even have a public database on. What could you have be public other than those two entities talking.

So, it is in parens because it's just not clear.

And then in response to something you said, Paige, the MOUS I think we agreed were only one option to look at. We're wanting to make sure that our recommendations are not that the MOU is the option for enhancing federal and non-federal sharing.

MEMBER RATH: Yes. And actually just to add to that. This is Charla again.

That what I think we sort of figured out too is that originally when we were talking about doing a workshop it was really we were talking about it in the context of a DoD use

case.

But I think what became clear is that really is a broader workshop to really talk about the full range of possible use cases.

The other thing I did want to mention, and Jennifer alluded to it, is that I do think that what's going to come out of finishing up this white paper are going to be a series of recommendations for further CSMAC study.

MS. ATKINS: And I will go back to the comment on public safety in terms of incentives.

In many cases the public safety MOUS and agreements are driven by the need for interoperability for a common purpose. So it is a very different type of use case than a broader use case of federal access to non-federal spectrum, or I'll say increased sharing that could end up resulting in some sort of regulatory action as well to accommodate co-equal sharing or not co-equal sharing. So it is a very unique case.

CO-CHAIR GIBSON: Okay. With that we

would like to see if we can vote on these and have them for approval.

So let me take a stab and ask if we could vote on the whole slate of the recommendations. Is there a motion to approve the full slate of four recommendations as they're represented?

MEMBER ROBERSON: So moved.

CO-CHAIR GIBSON: Dennis Roberson moves and Paul Kolodzy seconds. Any further discussion? Okay, all vote by saying aye.

(Chorus of ayes)

CO-CHAIR GIBSON: Any opposed?

(No response)

CO-CHAIR GIBSON: Any abstentions?

(No response)

CO-CHAIR GIBSON: Awesome. Okay, thank you. I also would like to take a moment to acknowledge the work that DoD did on this because Fred Moorefield and the folks at CIO office were very, very helpful in pulling this together. So thanks to them.

Okay, Tom.

MEMBER DOMBROWSKY: Yes. Steve Sharkey co-chaired with me. This is Tom Dombrowsky. I'll go ahead and talk through the report and I'll let Steve chime in when he wants to or at the end, either way.

As we've talked before our report is fairly brief because, one, this is sort of an offshoot of other work we had done before.

Two, when we looked at this we didn't see sort of radical changes that we could come up with that we wanted to discuss.

Instead we focused very tightly on the idea of how do we get more collaboration in terms of information-sharing. So our two recommendations are completely focused on how do we get more interaction between the federal government and non-federal government parties on secret, classified, FOUO kind of information.

And what we found through some different discussions, and the full report goes through all the different discussions that we

had, who we reached out to.

But two different things. One, investigating other government and non-government structures for collaboration. So, the spectrum, consumers from the National Advanced Spectrum and Communications Test Network, both of those groups have had discussions between industry and federal government of secret and classified information in certain contexts.

And they seem to have a pretty good methodology of doing that. Whether you could actually use those specific parties, or NTIA and Commerce could use a model like that to set that up under the CSMAC itself. So that was one option we saw as a possibility for moving forward.

The second was other FACA groups that are within the government. Jennifer Warren provided the examples of other committees that are governed by FACA but still we're able to actually have secret or classified discussions depending on the material that had to be

discussed.

I think the real thing that we found is that it goes to the charter of the FACA group. If you can point to other statutes, basically, you may be able to have some discussions of just specific pieces of information. So the rest of the committee would be in the open, but when you had to actually go behind closed doors you could go behind closed doors.

So I think those are the two things that we looked at in terms of recommendations that NTIA could look at to sort of help us as a committee have more of those discussions when we get to that level.

And I think the final thing I would say is we look at this as sort of a supplement to everything.

We think in general having large open groups makes sense, but it also makes a lot of sense to have the smaller groups to actually talk to this when you actually get to the final sort of decision-making part of the process.

Because both parties need to have the trust to understand what the information is. The commercial industry has stuff they don't want to share out in the public. Certainly the federal government does. But if you could have those small groups that is protected possibly you can get to some solutions in some of those cases.

And with that I don't know if Steve had anything to add before we open it up to Tom.

MEMBER SHARKEY: Yes, Tom did a good job of laying it out.

I think the bottom line is I'd say if there's a will there's a way to make it happen. There are a couple of ways to I think make that sharing collaborative discussion work.

It really comes down to whether or not I think the parties want to actively engage. It probably comes back, Paige, to your reporting on incentives too, whether or not the incentives are there and interest on both sides to actively engage in that.

And to Tom's point on the smaller

groups, smaller groups really do give a lot more comfort. I think that's one of the things that we saw as we were looking at the AWS3 work. As the groups got very big and information is less controlled, they want to know where it's going. So some way to make sure that there is control over that.

CO-CHAIR GIBSON: Okay, thanks, guys. Any questions or comments? Okay, Paul?

MEMBER KOLODZY: Paul Kolodzy. Just a question. You're using NSC as being one of your examples and I'm kind of confused how that applies because that's actually a funding mechanism, how to get people to talk together to actually respond to funding possibility from the government.

I'm trying to figure out how that actually enables spectrum sharing as information in the sense of the context. Maybe I'm missing something.

MEMBER DOMBROWSKY: Yes, no, that's a fair point. But what they actually are allowed

to do under these contracts even in addition to the sort of funding part they also are able to, if they have an agency that's part of the group and has work that they're doing you can still have the discussions about technical data and technical information within the NSC. At least that's what we were told by the folks at the NSC.

MEMBER KOLODZY: Just as a follow-up. Classified information is classified information. So I'm still trying to figure out -- you can't just wave a wand over that and just say because we're part of this group we can talk about it.

MEMBER DOMBROWSKY: Oh no.

MEMBER KOLODZY: That's why I'm kind of confused. You still have that protected information issue.

MEMBER DOMBROWSKY: Agreed. Yes, you still have that problem. But it was more that they have a way of at least getting the right people in the right room and then seeing if they can get to the classified discussion while complying with all the other requirements for

protecting information.

CO-CHAIR GIBSON: Yes, and it's Mark. I can add some color to that because I actually brokered the discussion with Alan Purdy and Van on that topic.

And you're absolutely right. You're lacking a contract vehicle to engage in those. So you don't have sponsorship for D4's and whatnot.

But what they did say was to the extent that that can be put in place it establishes a framework for the sponsorship of the clearances if they don't exist, or to use of existing clearances.

So we felt in that -- and I participated. So we felt like in that context it provided at least a framework where none may have existed otherwise, notwithstanding what you said in terms of some of the I wouldn't say barriers, but the requirements.

MEMBER KOLODZY: So this would actually be very good.

CO-CHAIR GIBSON: Yes.

MEMBER KOLODZY: If you're telling me that the NSC could actually own the 254 and members of --

CO-CHAIR GIBSON: No, no.

MEMBER KOLODZY: Okay.

CO-CHAIR GIBSON: The 254 is owned by the sponsoring agency. The NSC provides a framework to establish the relationship through the OTA. So the sponsoring agency could be NTIA or not, depends. And in fact we made a point of saying it may not be.

But in the event that there is early opportunity for the discussion, and I don't think there's any out there that are like that, but if there is an early opportunity for discussion, all the i's have been dotted, the t's have been crossed with respect to it passing through the consortium, if the sponsoring agency felt like there was the need to engage industry they could through the consortium or directly through the DSO or DAA, whatever, sponsor the clearance and

actually have that discussion.

And the idea would be that they're hoping to entertain interested parties in the context of the discussion of spectrum usage.

So, Alan described a very complex framework that would need to be examined. That's the crux of the recommendation.

MEMBER WARREN: Jennifer Warren. With respect to the examples provided I think one of the next steps would have to be looking at whether there was an actual governing act that could be incorporated into something that was relevant to CSMAC or Commerce Department writ large.

We did not take it to that step. We simply looked at examples that exist elsewhere where they have been successful in funding mechanisms to allow for confidential briefings and what have you of sensitive data.

So that's, again, I just wanted to be clear how far we've gone versus what's still to be done.

MS. ATKINS: This is Paige Atkins. So there's quite a significant difference between sensitive data and classified data. I would keep those separate. The small groups may be relevant and easier with sensitive information. We've discussed certain issues with them in the past.

The bottom line from my perspective is with the consortium and/or the NASDN vehicles. It's all about you have some sort of contractual mechanism in place. And that's what you're leveraging and it's still really the same roles that apply with any other contractual mechanism.

And I did notice a couple of things in the report that we'll need to correct around the OTA and how it's described.

So it's -- we just need to be careful in terms of referencing models that are basically the same kind of method that you would use to exchange classified information in particular. And we would not necessarily endorse a specific contractual mechanism to do that.

The other comment I wanted to make was

related to the FACA recommendation. Does anybody else have comments on the NASDN or NSC?

So on the FACA recommendation there are FACAs or federal advisory committees that do work on classified issues.

I think the challenge that we would have is the constraints that tends to put you in in terms of membership as well as transparency.

And so it is a potential vehicle we can look into, but I would be concerned particularly for what we're trying to achieve here that it would constrain us in a way that is working against what we're trying to do.

And so I just want to share that with you.

CO-CHAIR GIBSON: Okay, thanks, Paige. Motion to approve the recommendations? Larry? Sorry.

MS. ATKINS: Sorry. One other thing I did want to mention.

So, everyone here should remember that we were working on an industry government

collaboration that the last subcommittee looked at and said it felt like a reasonable approach.

So we are fleshing that out. In fact, we should -- that's under Dave Reed's shop as well. So we should be pretty close to a point where we will start taking actions looking at that multilayered approach including smaller venues that we could leverage to spur more robust discussion.

So I just want to let you know that we are pursuing that and fleshing that out to a detail that we can actually sort of come in.

CO-CHAIR ALDER: Okay. I just had a question in your work. Was there things you looked at that you thought didn't work?

Like I noticed that the MOU mechanism that was used before wasn't mentioned. Were there some things you guys looked at and said you know, we don't recommend doing this?

MEMBER DOMBROWSKY: Not so much that we found things we wouldn't recommend, but we went down some blind alleys, I'll say that. We

started down a path and said no, that's not going to work.

So it's more of -- we had some examples of cases where folks we thought had been collaborating in reality it was more dictating rather than collaborating. I'll leave it at that. I'll leave the names out to protect the innocent. So, I don't think we have anything.

CO-CHAIR GIBSON: This was a complex problem that we were trying to solve because we wanted -- the context of being open and transparent as Paige was saying, but allowing the facility to share data that at least is considered CUA or FOUO, whatever the designation is anymore.

We didn't really get to the point where it was classified. To the extent we could that's more like extra credit.

And I think there will be more work on this. But the recommendations are what they are.

Speaking of which we have a motion. Is there a second? Are you going to make a

comment?

MEMBER ROBERSON: Well, I had a question. Just to follow up on Larry, I think what you described would be really helpful to document to find out where are the blind alleys.

Identifying blind alleys is really helpful. Otherwise others are going to follow those same blind alleys.

CO-CHAIR GIBSON: All right, we have a motion to approve. Is there a second? Mariam. All in favor say aye.

(Chorus of ayes)

CO-CHAIR GIBSON: Any opposed?

(No response)

CO-CHAIR GIBSON: Anybody on the phone?

(No response)

CO-CHAIR GIBSON: Any abstentions?

(No response)

CO-CHAIR GIBSON: Great, thank you. Okay, the next one is measurement and sensing in 5 GHZ. So I see both Dennis and Paul. Who's

going to do it?

MEMBER ROBERSON: We're going to do it as a dynamic duo.

CO-CHAIR GIBSON: That's what I thought you guys were.

MEMBER KOLODZY: We're going to share. I'll start off with the first five slides. Then Dennis will have the last six slides.

But actually I'm not going to go into all the materials we can read on our own.

Just to kind of remind folks this was a study as to looking at the two 5 GHZ bands that Paige mentioned and actually looking at how to take measurements in those bands for trying to determine if there was spectrum sharing possibilities, and then how to enable spectrum sharing, and trending analysis and sense of flow spectrum sharing type of measurements.

And we did look at -- this is the framework. We did look at areas as to their distinct differences between priority spectrum sharing which means you just have to find out if

somebody is in there or not versus actually trying to initiate a robust system that actually could protect against interference and against incumbents or your sharing partners, interference between those. And we have to look at that very carefully.

We started off a little bit broad in this group and then we narrowed in quite a bit since the last meeting trying to focus in just on those two bands.

So I think we'll try and take the credit for having some of the longest recommendations. But I'll try to paraphrase these.

In a sense the first recommendation is for priority sharing, trying to determine the viability of sharing those techniques.

If you look at the two bands, the lower U-NII-2B band, you take a look at that and say listen, that is actually a system that it's quite predictable what's going on.

And therefore using a measurement

technology and architecture that simply does a lot of integration to pick up weak signals and to be able to be fixed is quite viable in that area for pre-sharing.

How often is it being used and what's going on with those bands. And those are used for airborne telemetry. So therefore you know where it's going to be operating. You know where it's going to actually be used. Very nice fixed resources to try to do that.

That should be put in contrast to the U-NII-4 band which is a very distributed system if it's being used for the DSRC and the like. And then trying to understand exactly how you're going to determine those systems actually are there. That will require a lot more systems distributed over a variety of areas.

So, we're trying to basically say it's one measurement architecture does not fit all constraints, that you're going to have to take a look at looking at things that are matched to the type of signatures that you're actually trying to

measure.

It's not taking a spectrum analyzer up there and asking the question is there something there.

On our second recommendation which is now moving from trying to determine priority sharing to after you are starting to share so how do you enable sharing, and how do you look at post sharing, there we looked at the two bands very separately again.

First of all, the lower bands, because a lot of these systems in the database that are applicable to databases have needs because satellite systems that could be dynamically -- the database could be dynamically updated seems to be a natural process you do to actually be used there.

Or you can actually look at sparsity distributed fixed elevated sites to be able to -- because those are very long range and so therefore once you get them up you actually have a very good indication of exactly the footprint

those are operating.

So that was a thought of the lower band.

In the upper band this is where you're going to see in a future recommendation augmentation techniques might be the thing to look at for policy.

So if you're going to have a distributed system out there using the band why not -- and you haven't deployed all the heavy work just yet, why not augment the signal to make it easier to detect.

You don't need to have null sector updates. The question is what type of augmentation techniques like beaconing or whatever can be utilized so that it will make the detection probabilities much, much higher.

So in some sense it's going away from how to make a better measurement system and more to the way of asking the question maybe you need to investigate how to make the problem easier versus trying to figure out how to build a bigger

system.

And so we actually recommend that you take a look at some of those augmentation technologies. We'll be writing up some of those in the report as examples of augmentation technologies, but beaconing is one example of one, or preambles or whatever which is a type of beaconing that can actually be built into the signal.

So those are the first two recommendations. I'll pass it on to Dennis.

MEMBER ROBERSON: The first two recommendations were very focused on the 5 GHZ topic. The remaining four are actually broader and certainly encompass the 5 GHZ but are broader.

I will add one important element even as I start my portion, and that is to recognize Ed Drocella and his contributions.

Because Ed as many of you would know is an absolute rock in this area, or maybe the rock would be a gem like a diamond, but he is

really very, very helpful in our deliberations and we really want to recognize him for that.

Our recommendation three though begins to look at establishing measurement criteria.

One of the challenges that we have often when measurements are taken, people go off and invent their way of doing their measurements, come back with results and say see there. This is the answer.

And then somebody else goes off and does another set of measurements using different criteria and different approaches and contradicts the first one and you're back and forth.

So there's no underlying criteria or standard for doing the measurements. So, the recommendation here is that we seek to establish a standard approach to measurement so that when measurements have exceeded that standard then they would be viewed as something that decisions could be taken on. If they fail to exceed the standard then they would not be viewed as valuable. Maybe anecdotal information, but not

valuable.

The fourth recommendation was a very comprehensive piece of work. Several of you are already enjoying the page after this.

But we undertook a small piece of work which expanded as it often does. And this is really Mark McHenry and Paul and I.

Our little matrix, I actually calculated it. Our little matrix has only 10,496 decision points in it.

And the recommendation here is that since we got tired that the NTIA should take this up.

What we did do, and what you'll see on your chart, we did specifically focus on the two relevant 5 GHZ bands and what you see in the top just to help you even decipher what this is. Larry was struggling with this a little earlier.

But on the rows side are the different approaches to measurement. We came up with 14 different ways of measuring, different structures for that.

And then we established seven different parameters of high performance, low performance, high altitude, and so on. And there could even be more but we came up with seven.

And then we slotted specific examples in the top level of systems that did fit in those criteria.

So the yellow one in the top, the second logical column over are some of the systems that we are interested in particularly for the U-NII-2B band.

And then if you look down below you can see the techniques that would work to observe those bands and the techniques that wouldn't work quite so well.

And what you see off to the left purposefully is as you get beyond the first few columns there are a lot of blank columns, and that is indicative of the work that needs to be done. So that's the recommendation four.

And I actually do think it's very valuable. It's a lot of work to put such a thing

together, but it is valuable in understanding how to see things. And it does contribute to the other recommendations.

Recommendation number five really Paul already pre-referenced it. This has been work that has been bounced back and forth, FCC as well as discussions here.

But it often is very, very difficult to detect some of these signals and to understand what they are. So, adding additional identifying characteristics to the signals, mandating those such as beaconing or some -- if you go historically, call signals or some way so that the uniqueness of the way form, some way that you would be able to identify what it is that you're seeing out there is the recommendation.

And the A part, B part, A part is just to declare that B part is -- since this really is important to the FCC as well that this be a collaborative effort between NTIA and the FCC in that area.

The final recommendation is around the

sensing itself. The challenge here is that you have various signals occupying a specific band. And if you're trying to sense what is interfering, what's out there that shouldn't be out there you never know when to look because the signals aren't coordinated in time.

So if we did establish sensing periods as a mandate within signals so that there were points at which you could look and know that all of the signals that were within certain categories were turned off that would be enormously valuable to identify other signals that are there that maybe shouldn't be there or maybe are coming from a long distance or whatever it might be.

So those are our six recommendations. The final couple of pages illustrates some -- or two before the final one are sample band characterization.

And this, I really compliment Rick Reaser and one of his guys for pulling this together. So this is the work that I referenced

on the earlier chart of identifying all of the actual signals that are in the relevant bands. In fact, the whole 5 GHZ but this is looking at the U-NII-2B on the first and the U-NII-4 on the second of these charts.

This again is a large matrix because it does cover all the way to looking before. So we looked from 4.9 through 6 GHZ and have a compilation. But this is a significant contribution that was made by the group just in pulling this together. And again, kudos to Rick on that.

The final chart says that our perspective is that while we did a lot of work there's a lot more to be done here. So this may be a candidate area that we would wish to continue as we move to the next round of CSMAC adding additional questions but working in the same domain. It's a fertile area.

An opportunity of course would be for an NTIA team to come back with our recommendation for fleshing out the matrix, the colorful matrix

and say great work. Go back and do some more of that.

CO-CHAIR GIBSON: So thanks again. So thanks gentlemen. Any questions or comments?

MEMBER ROBERSON: Well, first any comments from colleagues?

MEMBER REASER: In picking up a little brochure here, that matrix that we did, that's sort of like the investigation of the crime scene.

So, in order to do the spectrum forensics part of this you have to do the crime scene investigation first. So that's one of the things we want to recommend.

That's why Ed was so helpful because the federal spectrum kind of ends at 5 GHZ. So we had to go off and figure that out. Ed was a super help in that regard.

But you kind of have to know everything that's out there before you can decide what to do with it. And that was kind of why we went down -- and I know that Paige thought we

went down a rathole.

(Laughter)

MEMBER REASER: So we focused on the two bands. But really, I mean sure, you're going to have to figure all this stuff out. There's going to have to be something like this done to keep track of stuff.

CO-CHAIR GIBSON: All right, thanks. I would like to strike the term "crime scene" from the record but it's already out there.

MEMBER REASER: Forensics?

CO-CHAIR GIBSON: Yes, that's different. Mike, did you have a comment?

MEMBER CALABRESE: Yes, Michael Calabrese. So, a question on each of these. Well, lower-upper.

So, for the lower it seems as if you anticipate essentially an extension of 3.5 ESC approach that there would be -- on the civil side there would be a sensing that that's going to communicate to a geolocation database which seems to be what you're describing.

But I'm wondering on that band did you consider whether the radar system itself could signal or beacon? You know, if it wouldn't be very economical to add something even if it's on another frequency so that the radar says I'm doing my radar thing right now, get out of the way, as opposed to having to have a more elaborate -- the need for an elaborate mechanism, what I can do at 3.5 to detect.

MEMBER ROBERSON: That is actually recommendation five.

MEMBER CALABRESE: Oh, okay.

MEMBER KOLODZY: Yes. But be careful. We're trying to distinguish between these because some of them are military radars and so we're not trying to give them beaconing based on the people they're using it for we don't want them to deal with beaconing off it.

MEMBER CALABRESE: But you want potential users to hear something.

MEMBER KOLODZY: Well, no, we were trying to distinguish -- that's what we said

about privacy and security in recommendation five.

If you're going to augment you must take into consideration. We talked a lot about this within the group between security and privacy versus having an easier way of sensing.

In the cases where it's military radars we were concerned very much about the security, ergo why we actually looked at the sensing network to actually do it that way versus the systems which may not have the security issues like DSRC and stuff like that. Then you might be able to use augmentation to make it much easier to signal.

CO-CHAIR GIBSON: That was the subject of no small amount of discussion.

MEMBER KOLODZY: At least two meetings.

MEMBER ROBERSON: Yes, I was going to say, multiple meetings worth of conversation.

MEMBER CALABRESE: So I just want to ask, do these recommendations have any reference

toward -- I guess I'm just not seeing it -- whether federal users should consider and it's just announcing them. Putting something out that's easier to detach. As opposed to relying on the civil side to set up a sensing network, or use a sensing network and relay the information to a geolocation database.

MEMBER KOLODZY: And the answer is yes, actually that's what recommendation five says as Dennis said.

We do recommend that NTIA look at that as long as they take into consideration the privacy and security aspects.

MEMBER CALABRESE: Oh yes.

MEMBER KOLODZY: And that's the only thing we're saying. Because we think in some areas it's pretty straightforward, but in others it was a little grayer. And then we'd have to actually take a look at it from the federal services view as to could they give up that security or privacy issue and still maintain either job.

**CO-CHAIR GIBSON: And they mentioned beaconing. I want to just keep us on topic. This is measurement and sensing. This isn't implying that there's any special thing that the federal user is doing to say yes, I'm here. It's measurement and sensing.**

**And so some of this is supposed to be in the context of what they're already doing. And I think Paul's right, that's what recommendation five is trying to do.**

**To the extent -- what you're talking about, Michael, is something that should be discussed. I think it's outside the context of this working group unless we're talking about putting beacons on federal systems.**

**And actually that did come up. Paul talked about putting beacons on radars to the extent feasible.**

**But I can't overstate what Paul and Dennis and what Jennifer is busting to say is that the operation security issues that are attendant to this issue have to be considered.**

And I think that's very important.

MEMBER CALABRESE: So I was assuming the security issue will be considered either way.

CO-CHAIR GIBSON: Yes.

MEMBER CALABRESE: But I just wanted to make sure that we're considering that a tool and a kit shouldn't be for the federal incumbent to beacon and signal because in fact that might actually be better for them. They can be heard more clearly than try to pick out a way for them, for example.

The other question is on the upper part of the band is, so you talk about consider employing a signal augmentation beaconing approach. What's a practical example of that in the 5.9 band? For DSRC purposes.

MEMBER KOLODZY: This is Paul Kolodzy. As an example, I would just say not the only thing between the group we were talking about, if you have DSRC and you have actual systems that are deployed, your bay stations or whatever your systems could actually beacon out on a very

infrequent basis since they don't move where they're actually being located and where they're actually working at.

So you can actually see where the corridors are and things like that. So that could be an example.

We're hoping that we'll have some people around that actually could pick out even better examples.

CO-CHAIR GIBSON: Okay, thanks, Michael. Tom and then Jennifer.

MEMBER DOMBROWSKY: I'm going to defer to Jennifer.

MEMBER WARREN: Jennifer Warren. I actually have a couple of questions and a comment which I'll save for last.

So, in reading these obviously in my mind in reading recommendation one and two really stuck to the question of the two 5 GHZ bands whereas the other three, four, five and six seem to be articulated to a broader applicability, or at least a desire for broader applicability.

So, with that in mind, that's why I'll make some of my comments because they're actually not limited.

But I wanted to ask for recommendation three it seems like that would be the first step for anything. Would you agree? Defining the measurement systems requirements.

It seems to kind of set out generally what a measurement system should look like.

So, before you were talking about techniques. Would you have to do this one first? So recommendation three would actually be the first.

MEMBER KOLODZY: Yes, you don't know what you're measuring but you know it's there.

MEMBER WARREN: I'm just checking.

MEMBER KOLODZY: And it turned out it was the first thing we really dug into.

MEMBER WARREN: Okay, that makes sense.

MEMBER KOLODZY: So, not surprisingly just to continue my comments are going to focus

on recommendation five. And I probably will recommend at the end that we do the recommendations one at a time.

So, I was really heartened to hear the discussion that took place that isn't really reflected here except for that last line.

MEMBER KOLODZY: -- the last sentence.

MEMBER WARREN: Very nuanced. I think what's missing here though is a reflection of policy to actually augment the low probability detection of many systems, of federal systems from an operational perspective.

This seems to suggest that there's not value in that, or that we need to address both security and privacy. We say that about a lot of things. It doesn't really reflect that there are policies to augment low probability detection in some federal systems.

MEMBER KOLODZY: And it's one federal system you're talking about.

MEMBER WARREN: No, not really.

MEMBER KOLODZY: Now all federal

systems are LPD.

MEMBER WARREN: No, I know, but there are efforts to expand LPD. But I mean there are policies, and I think there ought to be a recognition stated that there are systems that are designed for LPD and LPI of course as well.

MEMBER KOLODZY: Well, that one sentence when you read it in the report actually will go into that.

MEMBER WARREN: Okay, so this one line in the recommendation has a much larger import.

MEMBER KOLODZY: Oh yes.

MEMBER WARREN: I didn't understand that.

MEMBER KOLODZY: These recommendations were long enough. We started actually putting all that in.

MEMBER ROBERSON: Well, in fact, some of these recommendations as long as they are were a page long before we cut them back to what you see.

MEMBER WARREN: Okay, so the report

will be very clear that there's federal policy behind --

MEMBER ROBERSON: Yes.

MEMBER WARREN: And to support LPD as well. It's not clear -- well, I can't tell that.

MEMBER KOLODZY: That's what security generally means. When somebody is having an LPD system and they're insecure because it can be detected that's usually a lack of security.

CO-CHAIR GIBSON: Okay, so Jennifer's question is answered that it should be in the report.

MEMBER WARREN: It will be in the report.

And then on the second part of that for B it would seem to me, and we were talking about this, there may be detectability and mitigation for the commercial signals is intended to also include identification or attribution.

But it wasn't clear to me that when you look at 5B that detectability and mitigation actually includes identification and/or

attribution to what device or what the source is.

So if we're talking unlicensed devices.

MEMBER KOLODZY: This is Paul again. Yes, agreed on that statement. That sort of exists in the coordinated sensing is so that you could actually separate out the wheat from the chaff, that you actually know what you're detecting versus detecting the sharing signals versus detecting the primary signal.

So that's actually -- five and six actually go together in that respect.

So I see what you're saying which is you're asking the question how do you know you're actually measuring the primary, right?

MEMBER WARREN: How do you know -- beyond that it's an unlicensed device. How do you know whose unlicensed device it is?

MEMBER KOLODZY: But that's not detecting the primary. Are you looking at the primary being the unlicensed device?

MEMBER WARREN: Again, these are broad

statements. This isn't specific to --

MEMBER KOLODZY: Well no, we're looking at the question that we're trying to answer. We're trying to answer when we're trying to share how do we detect.

So if we detect something and it's not even the primary.

MEMBER WARREN: What if there's no primary? I mean, there's no assumptions here to say one isn't primary and one is primary.

There may have been a lot of discussion but standalone recommendations I can't tell what your assumptions are for that sharing environment. So that's why I'm asking this question.

CO-CHAIR GIBSON: You look puzzled, Paul.

MEMBER KOLODZY: I'm puzzled.

MEMBER TRAMONT: So how do you mitigate if you don't know who it is? Sorry, Bryan Tramont. How do you mitigate if you don't know who it is?

MEMBER KOLODZY: Well, the question is is the measurement system requirements we're trying to detect in a lot of cases. So if you don't know who it is but you're detecting a signal that tends to tell you you don't want to use that signal.

That is at least a very high bar to prevent interference.

CO-CHAIR GIBSON: So you're saying it's in a sense an avoid approach basically?

MEMBER KOLODZY: Well, that's one example.

CO-CHAIR GIBSON: Okay.

MEMBER KOLODZY: So that's why I'm confused. If I don't know who it is but I don't use the band then I'm not interfering with it so that's a high bar.

Then you go to the low bar which is I want to share as much as I can, and at that point then you have to take a look at things like what recommendation six indicates which is how do I separate the different signature types.

MEMBER ROBERSON: And a critical point that is implicit in all of this -- this is Dennis Roberson -- is enforcement.

We put enforcement on the table and then took it right off again because it was such a big topic by itself. And it sounds like you're moving down the path towards -- no?

CO-CHAIR GIBSON: No. I think I know where this is going. So Paul? No, it's a good thing, I just want to -- Tom?

MEMBER WARREN: I'm done for now. Thank you.

MEMBER DOMBROWSKY: I had a feeling she would cover my question but she didn't quite get there. That's too bad. Tom Dombrowsky. Just a quick question.

I know there's going to be a big report behind this, but when I looked at the question it was talking about strengths and weaknesses.

The way I read these recommendations were we had to do a bunch of measurements and do

a bunch of analysis before we can even figure out what the strengths and weaknesses are. Am I misreading that completely?

Because the question was what are the strengths and weaknesses and how are we going to overcome them. And it seems like there's a lot of sort of measurements and things of that nature, data-gathering and analysis that you're suggesting. But I'm not sure how it's getting to the question itself which is what are the strengths and weaknesses.

Should I use measurement or should I use sensors? I didn't see that in the recommendation. That's what confused me.

MEMBER ROBERSON: I think where we came at that was really the colorful chart again.

Because it isn't use or don't use, it is use the right tool. So, if you use the right tool you can accomplish significant things.

MEMBER DOMBROWSKY: And is the full report going to go to sort of that kind of level of information?

**MEMBER ROBERSON: Sure.**

**MEMBER KOLODZY: Well, yes and no. it's going to tell you we want you to do that. Remember, we didn't say -- we didn't fill out the entire archive.**

**But for instance, if the signal is weak and distributed versus the signal is weak but in a very localized area, versus the signal is an airborne signal going over long ranges with high gain versus a signal that's a satellite that's going down because uniform signal strength, field strength, that would have you go down different directions than actually how to use the measurements.**

**MEMBER DOMBROWSKY: And so the full report will sort of go through the fact that it's not a black and white answer, it's going to depend, and you've got data here that sort of tells you all that.**

**MEMBER KOLODZY: Ergo the first recommendation actually says one size does not fit all.**

**MEMBER ROBERSON: And that's the critical point of this. The question as stated sort of suggests is it or isn't it.**

**Well, it depends on what tool you're using. If you are trying to cut a board in half and you try to use a hammer to do so maybe it will work, but it's not a very efficient way of sawing a board.**

**MEMBER DOMBROWSKY: Okay. I just needed clarity because I haven't seen the full report, I just saw the recommendations.**

**CO-CHAIR GIBSON: Harold, did you have a comment?**

**MEMBER FURCHTGOTT-ROTH: Yes, just seeking some clarification on the report. This is very helpful in a lot of ways.**

**And I think this may build on some of Jennifer's concern recommendation 5B and focusing more on the sharing part.**

**I think a lot of discussion I think is that incremental sharing above and beyond where we are now.**

But if you look at cable allocation for federal users and non-federal users there is every -- not every, but most bands of spectrum are certainly 5 GHZ. You have believe federal users and non-federal users already there.

They're already sharing every possible aspect. That's without even considering unlicensed applications.

So, in writing it up to try to clarify exactly what you mean by techniques to augment the detectability and mitigation of transmissions from users and services that shares federal spectrum.

And whether you need every non-federal user that's already using the band, whether you're talking about incremental non-federal users. There's a lot of different applications that are going on. A lot of focus on the 5 GHZ band by a lot of non-federal users too.

CO-CHAIR GIBSON: All right, thanks, Harold. Mike?

MEMBER CHARTIER: Yes, Mike Chartier.

Just to comment on that.

One of the long discussions we had on that point for wi-fi type uses is that every other app on your phone asks if it can use your location information as being able to augment that app, or to get access to something.

So you can easily envision where that type of information could be captured for individual users. And especially when you're talking about interference. If you even capture 10 or 20 or 30 percent of the users that's useful information in understanding the potential for interference, and also a potential mechanism for turning it off, or shifting it to another band.

That's one of the areas where we looked at sharing personal information might be able to augment both getting access to the special mode. Also mitigating any interference if it occurs. We know it's coming from this location. These are users there.

MEMBER FURCHTGOTT-ROTH: Just as we're aware of the enormous privacy and security issues

that are encompassed in all of that.

CO-CHAIR GIBSON: I think we're well aware of that.

MEMBER CHARTIER: It's enormous, but people do it every day millions of times a day.

MEMBER FURCHTGOTT-ROTH: Yes, but when you get the federal government involved in actually doing that it's very different from private entities.

(Simultaneous speaking)

CO-CHAIR GIBSON: All right. I'm going to turn it over to Paige now for her comments.

MS. ATKINS: This is very good work. It reminds me a little bit of enforcement. It's a very complex multilayered challenge so it's how we dissect it. So we again take the right actions at the right time.

And a couple of my high-level comments initially will be applicable really to all of the recommendations.

We have to think about limited

resources and understand what our priorities are and when we get multiple recommendations back on particular topics if you can help us understand kind of the timing and priorities that we should consider them in as we weigh resources because we won't be able to do everything.

And in some cases these are -- some of the recommendations, not necessarily just here, but in general are quite labor-intensive. So we want to help us understand what that should look like.

MEMBER ROBERSON: But if I could give part of the kudos to Ed Drocella, one of the things that we used as a test for our recommendations is to have Ed determine whether or not he could write a work plan associated with the recommendation. And he could.

MS. ATKINS: Doesn't mean he has the resources.

(Laughter)

MEMBER ROBERSON: I was going to say exactly that. That does not obviate what you

said, but at least a work plan could be constructed around these which is sometimes not the case. You put a recommendation in. What do I do with this.

MS. ATKINS: And I think if he understands it enough to do that that's important.

But at the same time just on the recommendations as they're written here they could be tightened up a bit so we really understand the intent and what the action is intended to do or should do.

For me it wasn't totally clear as I read the slides. So I ask you to re-look at that.

Also, in some cases, for instance some of the recommendations seem to perhaps overlap a little bit with last year's recommendations in terms of approach.

Like the recommendation one to me looked like it was focused on occupancy measurements. And in terms of the approach that

was laid out last year I'll start with limited measurements, characterized, more detailed measurements, get cetera.

So if there are interrelationships with the recommendations from the last term or the last set of questions, if you could identify those I think that would help us understand things that we're trying to consider, and again, priorities and sequencing.

One of the areas I was a little confused on. This covers the scope of everything from a device-based DFS to dedicated sensors and measuring capabilities. Is that true? Because it was a little -- I didn't necessarily get that from the material that I was reading.

So just again, that may be my own ignorance to be able to pull it out. So if that's the case I just want to make sure whatever's written up is clear on that.

MEMBER ROBERSON: We're back to the challenge where the documentation is intended to cover that. These without the documentation

sometimes are a little bit obscure.

MS. ATKINS: And I think those are basically my primary comments and questions. I appreciate it. And again, a lot of good work in a very complex area.

CO-CHAIR GIBSON: Okay. Thanks, Paige. This one got a late start too because everybody was really busy at the outset. So we actually had about a weekly meeting cadence on this. So there was a whole lot of work put into this.

Let me just take the temperature of the room at this point. How many people feel that we have a set of recommendations we can vote? Are any of these recommendations voteable at this point?

Jennifer is concerned and I kind of tend to agree that voting en masse is probably not going to work. So which do you think should be extracted perhaps and voted on separately?

MEMBER WARREN: I don't want to be presumptuous but I certainly would think that

recommendation five should be voted on. I mean, it depends. Do you mean to move forward for consensus?

CO-CHAIR GIBSON: Yes.

MEMBER WARREN: Well, I would think recommendation three is a very easy one to vote on and to support.

Oh yes, one and two, three. Sorry, I was taking out. My apologies. Probably even four. I think it gets a little -- there are more questions at least for five. And we didn't have a lot of discussion of six, but if they're interweaved then I would bring six together with five.

CO-CHAIR GIBSON: So what I'm hearing from the chairs is that there's a lot of detail that they couldn't put in these recommendations.

And I saw the recommendations and they stripped a lot of it out just to make them readable. Well not readable, but you know. Not loquacious.

Do you feel like with the appropriate

explanation that these fellows say that is going to be provided we would have a slate of recommendations we could vote on, or should we vote on one to four and pull five and six out?

MEMBER TRAMONT: Does that mean we do them in August?

CO-CHAIR GIBSON: We'd have to do them in August, yes. What would you guys prefer? Do you think you could add more detail to five and six between now and August so that we could -- Steve, do you have a comment?

MEMBER ROBERSON: I mean, unless you want to just try and take a vote, do one through four, and see how things go with five and six. I mean I think that they're fine.

CO-CHAIR GIBSON: Okay. Let's do it that way. Let's do one to four, and then five and six. One through four together and then five and six together and we'll see where it goes.

We're looking for consensus. It's not unanimity. To the extent we can be unanimous in this August bunch.

So is there a motion for approving recommendations one through four? Kurt and Steve. Any further discussion? Please no.

Okay, so let's vote to approve recommendations one through four. All vote by saying aye.

(Chorus of ayes)

CO-CHAIR GIBSON: Any opposed?

(No response)

CO-CHAIR GIBSON: Any abstentions?

(No response)

CO-CHAIR GIBSON: Awesome. Okay. Now, let's look at five and six. Is there a motion for approval of five and six? Mark and Michael. Okay. Any further discussion on five and six? No, okay.

Vote to approve five and six. All approve by saying aye.

(Chorus of ayes)

CO-CHAIR GIBSON: Any opposed?

MEMBER WARREN: Wait.

CO-CHAIR GIBSON: Oh, you're opposing.

Okay, one opposition. What could we do to the recommendation?

MEMBER WARREN: It's Jennifer Warren. It's so dependent upon what's in the report. And while I have no doubt about what's in the report I would hesitate to have this go forward as is. And I would like to have a little bit more discussion with Paul with respect to federal systems and LPD.

CO-CHAIR GIBSON: Okay. So let's do this for five and six. I know we have consensus so we can actually move forward, but I want to respect where Jennifer's coming from.

Since we have another meeting in August is it possible that we could have the report done -- you have the time frame you agreed to -- and actually let's share it with the whole group. I say that with reservation, but let's say share it with the whole group.

I'm not asking for a vote offline, but let's share it with the group so that we would be ready for a vote in August. Would that work?

MEMBER ROBERSON: I have a procedural item.

CO-CHAIR GIBSON: Okay, go for it.

MEMBER ROBERSON: All deference to Jennifer because I really would like to have it be unanimous, but we actually did take a vote and it was 10 to 1.

CO-CHAIR GIBSON: Okay.

MEMBER ROBERSON: So in a democratic system normally you would approach it that way.

CO-CHAIR GIBSON: Well, the recommendation is approved. I'm with that.

I'm just saying can we -- can we --

MEMBER ROBERSON: Oh, for sure.

CO-CHAIR GIBSON: Yes, that's all I'm saying. Stand by, Rick. Okay.

MEMBER REASER: Don't we have to approve the whole report anyway later? Right now we're just doing the recommendations.

CO-CHAIR GIBSON: I think the report is just the icing on the cake.

All right, so what I'd like to ask

Dennis and Paul to do is to at least get with Jennifer and change her vote to a yea.

MEMBER ROBERSON: No, I think that's -- important for us.

MEMBER WARREN: So what is the recommendation?

CO-CHAIR GIBSON: The recommendation is move forward. We've got like 95 to 1.

(Laughter)

CO-CHAIR GIBSON: I did ask for abstentions.

MEMBER WARREN: I didn't hear that.

CO-CHAIR GIBSON: Well, you said you had an opposition so I went to -- well, it's usually yea, nay, abstentions. Are there any abstentions?

(No response)

CO-CHAIR GIBSON: Do you want to abstain?

MEMBER WARREN: No.

CO-CHAIR GIBSON: Okay. Okay. So, the recommendations are approved with the caveat

that the co-chairs will communicate with Jennifer and work it out.

CO-CHAIR ALDER: And I think we had some suggestions --

CO-CHAIR GIBSON: And some suggestions.

CO-CHAIR ALDER: -- for the report. You indicate timing and priorities.

CO-CHAIR GIBSON: Okay. Thank you. Okay, now the next one is spectrum access systems. I see both co-chairs are here so Kurt and Jeff, take it on.

MEMBER SCHAUBACH: Kurt Schaubach. Good afternoon.

So, first I want to thank our subcommittee members for their participation and also John Nobel (phonetic) our NTIA liaison. And my apologies for the omission on the cover page.

What the committee has before it is five recommendations which we shared in draft form in the March meeting.

And since the March meeting what the

subcommittee has focused on is providing additional refinements of the recommendations and further context and tried to get very specific on its reactions.

I think the discussion that the subcommittee had really focused in three primary areas.

One is that studies and experiments with regard to use of database and sensing technologies are already underway internationally.

And it's important for NTIA to now set priorities and decide how it wants to engage. I think you see that in the thematically central recommendations.

Too, traditionally the U.S. has been a leader in the R&D around these technologies as well as an early adopter.

And we are uniquely positioned I think as a result of the -- the subcommittee believes as a result to both provide an honest assessment of the capability and relative maturity of where

these technologies are based on direct experience as well as be a resource for knowledge transfer.

And as part of that process as you look at adoption of these technologies abroad to be able to also help regulatory agencies understand what capabilities they need to have to actually make these technologies emerge.

And then I think third as you'll see in some of the recommendations that there are still some fundamental issues that need to be addressed both to facilitate adoption of these technologies as well as to accelerate that.

So with that again this is sort of the draft report. Between now and the August meeting we'll take these recommendations if they are approved today and move forward with the final draft.

So just a reminder, the study question involved database and sensing approaches about the U.S., the effect of the extent internationally and if so, how.

And the subcommittee's efforts really

focused on what challenges lie in using database sensing approaches.

We didn't specifically focus on the relative efficacy of technology. Instead what are again these challenges and then perhaps organization and culturally that exist in terms of adoption.

So, again, the five recommendations. I'm not going to specifically read all these for you, but maybe provide some context.

Recommendation number one really focused on priority-setting. Identifying both systems and bands that we've addressed or examined for sharing and starting to develop priorities around that.

Specifically there were some -- a framework that's been recommended here for the prioritization of timing which should look at and examine the impact on systems, specifically in the national security setting and commercial.

The degree of certainty associated with U.S. implementation. The degree of non-

realizable technical data required to implement a sharing framework.

This notion of regulatory capacity or capability required by foreign regulators to adopt a specific technology or sharing framework.

And either looking at progress of other countries or other priorities internationally in terms of how we harmonize with those activities.

Jeff, anything you want to add on that?

MEMBER REASER: We have some recommendations on how you might go about making a priority. So we didn't set them for you, but we gave you some ideas about how to structure and sort of talk about that.

But the other thing I think is important. We kind of said that we should put national security first, then safety of life second, and then sort of commercial or marketplace access as a third. So that was the other important point at the very end.

**CO-CHAIR ALDER: In being in some of those discussions there was kind of this debate between setting our priorities and just making a recommendation to set the priorities. And so it kind of went back and forth and landed here.**

**So I do think it's an important recommendation. We did not actually give you what the priority should be.**

**MEMBER REASER: No, we just gave you some ideas on how you might go about it.**

**CO-CHAIR ALDER: But the importance of actually having some priorities and narrowing it down is the critical message.**

**MEMBER REED: This is Jeff Reed. As we go forward I'm sure there will be negotiations that will occur with international entities.**

**The first rule of negotiating is everyone should be aligned. So we think that we need to establish these priorities now before we start to have these international engagements to be sure that we are able to achieve our national interest.**

MS. ATKINS: So I'm curious. Understanding that you didn't define the priorities, but gave examples.

I'm curious in terms of the sequence of priorities in terms of national security over safety of life.

MEMBER REASER: I think it had to do with -- there's always -- this is Rick Reaser.

There's prioritization and there's timing. So you have some timing things going on right now. We're adopting rules now that have a lot to do with national security. That's one of your big focuses right now is rulemaking going on. We're trying to figure out how to make that work. So that's sort of a hot topic now.

So, while we're doing that and as you've talked about this text in this report or the start of a report.

The last thing you need to have happen is for national security -- we've worked this whole thing out for us here in the U.S., and to go take the boat, or the tank, or the airplane

someplace else, it doesn't work. But it works great here.

And so that one there is -- that's on your plate right now. There's other ones that are like that, but that one there in terms of what is going on right now, we just thought that was ripe for the choosing.

So that's the specific one, the 3.5 area. So that's why we said you probably want to look at that one first.

Because Jennifer put in this comment about it's not just about priority, it's also about the timing part. So in a timing sense I think that's a really important one to look at now.

MEMBER WARREN: Yes, to pure priorities I think you mix a couple of different ones in terms of a list. It's not just pure priorities.

CO-CHAIR GIBSON: All right. We're kind of starting on the recommendations before you get through them, but let's go. Bryan?

That's okay.

Well, he's not done presenting the recommendations. So, there's five recommendations here and they're kind of complicated.

MEMBER SCHAUBACH: So, recommendation number two really focused on some of these fundamental areas of further study and investigation that we both facilitate adoption of sharing technologies internationally but maybe also sort of accelerate adoption.

Certainly the issues related to privacy and security. I think has come up as a theme in some of the other subcommittees, but also very much here as well.

And certainly in some of the interviews that the subcommittee conducted this was raised as a concern. For example, around the 3.5 GHZ band and development of sensing technology and not only how that sensing technology -- could that be used internationally and what are sort of the privacy and security

concerns related to that, especially operational security.

Also whether there are just fundamentally some restrictions related to the export of that technology. And should a more fulsome study with regard to ITA (phonetic) restrictions or other things be conducted.

And then there are some very good discussions around collaboration across borders as well as looking at how some existing spectrum mechanisms used internationally could be adopted here, whether or not sort of the restrictions associated with that.

Jennifer, anything you want to add to that?

MEMBER WARREN: No, thank you.

MEMBER SCHAUBACH: Okay, great. Recommendation number three focused on expanding efforts to engage internationally, specifically through standards bodies that are already actively engaged in looking at dynamic sharing and use of database sensing technologies.

So currently there's a considerable amount of work already underway with the ETC set through GPP.

And it would be advantageous for NTIA to begin to focus on specifically where and how to engage. And try to as opposed to just monitoring progress of these standards bodies develop a method by which they could more actively engage and actually contribute to the development of standards.

So some of the recommendations here were together with the FCC develop a more formal working group to identify and target which standards bodies NTIA would want to participate in.

And also for that working group to again look at establishing some priorities and a framework for participation.

Further, that it would be good for NTIA to focus on resourcing and address some of the resource issues to make sure that engagement in the standards bodies is possible.

And specifically the recommendation was to look at expanding the role in development of ITS.

Jeff, do you want to?

MEMBER REED: Sure. Let me go over four and five. This is Jeff Reed.

Recommendation four. NTIA should develop procedures to facilitate the disclosure of rate forms and for parameters to facilitate sensor sharing.

And this is a theme that has been echoed today and in previous meetings.

The context here is that we -- there will be others, there will be other countries that are considering some of the same issues that we're discussing in terms of disclosing information about wavelengths and how those are associated with defense agencies.

So, developing a policy that works for us, but also with the realization that others will be looking at how we set this policy. And if we can provide some guidance on how to set

this policy then we're much more likely to get a more rapid introduction of these technologies into the international community.

Mark, I know this one we focused on. Do you have any additional comments?

MEMBER MCHENRY: No, thanks. Go ahead.

MEMBER REED: Okay. All right. Recommendation five. NTIA should become more cognizant of shared spectrum R&D programs and work to disseminate information to government and international communities.

Sometimes I think we're a little inward looking in terms of the spectrum sharing technologies that are rolling out here.

There are actually major efforts that are going on around the world, particularly in Europe and many in China that we need to be better aware of.

And this can be a lot of work for everybody to participate in. So having a point man within NTIA that can look at it from an

international perspective, that can attend conferences around the world and can help facilitate peer to peer discussions with regulatory counterparts around the world, and help with the educational mission, the international education mission on socializing these ideas we believe to be important.

This is going to require resources of course to do it. We should also be perhaps more proactive in getting international participation and notice of inquiries. Specifically target international companies, international regulatory agencies for input to these notices of inquiries.

And the information is only as good as the dissemination of the information. So, as part of this the responsibilities of the person or group, they should provide publications of this information or facilitate having this information at the NTIA website. Questions?

CO-CHAIR GIBSON: Paul.

MEMBER KOLODZY: Paul Kolodzy. A lot of at least recommendation five sounds more

academic oriented in the sense of how to actually find out what's going on in R&D around the world or whatever is a little more difficult than just reaching out to their open forums, even the European forums.

There's a back door area, there's a front door area where there's a lot of people working on.

So what I'm trying to figure out is we have all these international conferences and everybody's passing data back and forth.

What is this role other than -- I'm trying to figure out that role and how valuable it would be with respect to actually understanding what's really going on behind the doors.

Because at least I know when I worked with both commercial and academic people it's a very different world.

MEMBER REED: It is. And it's hard for people in their day jobs to keep track of this, all that's going on around the world.

And having a point person whose main focus is making these connections, making sure that the right people are informed we think will help improve that communication.

CO-CHAIR GIBSON: Bryan, you had a comment earlier. I didn't want to forestall it.

MEMBER TRAMONT: I think I'm passing for now.

CO-CHAIR GIBSON: All right. Harold?

MEMBER FURCHTGOTT-ROTH: I think this is a great presentation. I think there's a lot of merit here.

Just a very tiny technical footnote on participation by international bodies in U.S. proceedings.

Having been involved in a litigation matter where one of the parties was an international government they do not take well to the idea that failure to participate in a U.S. government proceeding in some way limits their prerogatives going forward.

We are a very powerful government, but

I think we need to be very careful and sensitive about recommendations that we have outreach so that more foreign governments or foreign entities participate in our U.S. government proceedings.

There's a lot of international sensitivity there. I'll leave it at that.

CO-CHAIR GIBSON: All right, thanks, Harold. Did you guys want to comment on Harold's comment? Or Jennifer?

MEMBER WARREN: I just want to respond. Jennifer Warren.

Harold, I think your point's well taken. I think though that this was set up as NOIs as opposed to a rulemaking or anything like that.

But also, international participation as we discussed it was not focused necessarily on foreign governments, but foreign companies that are engaged in research and development as well.

It need not be the governments, but a lot of the companies which in some cases may be state-owned or otherwise. So you may indirectly

be getting the foreign governments.

But it was intended to be broader than that, just to clarify.

MEMBER FURCHTGOTT-ROTH: Two further points. One, international corporations of all types of ownership participate today in U.S. proceedings. And a lot of foreign governments participate in U.S. proceedings.

All I'm saying is to have a recommendation to the Department of Commerce that we should have more outreach to international corporations, or foreign governments, or international corporations that are owned by foreign governments to participate more broadly in U.S. proceedings, I just -- I think there is some sensitivity there.

CO-CHAIR GIBSON: All right, thank you. Dennis and then Bryan.

MEMBER ROBERSON: I'm really surprised Jennifer didn't jump up on the recommendation four. Because recommendation four, it talks about the notion of having the open waveform.

But the challenge here is of course our secure government systems where that information is viewed as classified information. And the newer systems are even more classified than the older systems. So I'm really unsure of where you're trying to go with this one.

Certainly for commercial systems maybe we could have this sort of thing, or for -- but I'm not sure where you go with this kind of recommendation when some of the critical things that you might want to have in an open database are going to be classified.

MEMBER REED: This is Jeff Reed. Yes, certainly that is true. There are certain things that are classified.

However, there are also ways to abstract it so that you can at least provide enough technical data to help facilitate the spectrum sharing coexistence.

So, and I think that's a part of it. We are still struggling with this ourselves. And other countries will be struggling with this.

So we have the opportunity to help guide them in their process by setting an example for how this could be done.

MEMBER ROBERSON: I guess the question is do you have some notion of how this can be done.

MEMBER REED: Well, yes I do, but it may be beyond these recommendations. And we've discussed this issue before. But yes, I do think there are things that can be done.

And I think one of the key things that can be done is actually having a very realistic appraisal of what should be classified and what shouldn't be classified. I'm not sure that we always have that.

So, I think that's a starting point. But that's beyond the scope of this.

CO-CHAIR GIBSON: All right, thanks. Bryan, then Steve, then Jennifer.

(Simultaneous speaking)

CO-CHAIR GIBSON: So are you deferring to Jennifer?

MEMBER TRAMONT: I am.

MEMBER WARREN: And I missed some of -- Jennifer Warren -- I missed some of this. My apologies.

I think Dennis is right in that we may be factually not correct here as well aside from any way to implement the recommendation. But it also may be we have some factual errors.

So for example, where it says waveform in the third paragraph, first line, waveform information is readily obtained by a spectrum analysis and is typically not classified. That latter, that second part is -- should be struck.

Are you saying the spectrum analysis is not classified, or the waveform?

MEMBER MCHENRY: When the system is radiated usually they're not classified anymore.

MEMBER WARREN: But just so you know it is -- the way you've structured this it says waveform information is typically not classified. That's not --

MEMBER MCHENRY: It's the spectrum

analyzer. When it's radiated.

MEMBER WARREN: That's not what this says.

MEMBER KOLODZY: The waveform is not the spectrum.

MEMBER WARREN: Right. I just think we have to -- there's a few touch-ups I think that need to be done. Perhaps we could take some editorial privilege to make it -- maybe more than editorial.

(Laughter)

MEMBER WARREN: That's it.

MEMBER SCHAUBACH: And actually I don't disagree with Jeff's point on a realistic view or assessment of what's classified and not classified. Sometimes I think things are overly classified.

But there are certainly things that should be.

One way to approach this is to look at developing envelopes of waveforms that could be used to protect. So you're not disclosing the

specific waveform, but still able to provide some way to detect it in a way that's not, that doesn't have to be classified, right?

I mean, similar to what was done with 5 GHZ where there were waveforms that needed to be protected and there were envelopes used so that you weren't giving away classified information.

**CO-CHAIR GIBSON:** All right, thanks, Steve.

**MEMBER SHARKEY:** Just to build on Steve's point. A similar thing is also underway in the 3.5 GHZ band to do exactly that, where they also act as that agent to assess and work with the federal agencies to determine what should be classified.

**CO-CHAIR GIBSON:** All right. I think Bryan and then Bob.

**MEMBER TRAMONT:** So, I think this is a hobby horse from a couple weeks ago but I just want to make sure I am clear about this.

So, the purpose of the report as I

understand it is spectrum access databases are a spectrum management tool that regulators around the country might want to look at.

And here are -- U.S. is a technological leader in these databases and we want to share what we're doing and look and see what other people are doing so that people are aware of the tool.

We are not saying that databases are the right way to regulate any particular spectrum band, or that it is the right way to regulate spectrum at large.

In other words, it's not a prescriptive about the nature of regulation. It's more discussion of what this tool looks like and what the capabilities are.

And ensuring that, for example, when our tanks travel or whatever that the devices work and we don't have sort of non-alignment with the international community when it comes to the use of these databases. Is that correct?

MEMBER SCHAUBACH: Yes, I think that's

right, Bryan. I think maybe the one thing I'd add is that there's a clear recognition that work is undergoing internationally and it's important to not let the train leave the station without us.

So, we have the ability to provide a realistic assessment based on our direct experience and influence and guide these processes, the standards and other things.

But certainly in other regions there's a much more coordinated effort between the standards development and regulation. And I think the subcommittee clearly recognizes that we need to be cognizant of that and help to inform.

So, yes we are being very prescriptive in the approach by saying this works, this doesn't work. But we shouldn't let that void or obviate our participation.

MEMBER TRAMONT: And this works and doesn't work is a technological matter. I think my sensitivity has been that until it's -- some of these are not yet proven commercially viable,

and I'm reluctant to start touting them as a panacea to some sort of connectivity issues when we haven't yet proven them commercially viable here is my sensitivity.

So, but my understanding is this doesn't go to that question.

CO-CHAIR ALDER: I'll just comment on that. I think the work was what are the challenges of doing the database in an international context as opposed to the domestic context, and what are some of the tools to address those challenges.

MEMBER TRAMONT: The challenges are technical, not commercial viability challenges.

CO-CHAIR ALDER: Well, I think some of the challenges relate up. The fact that it's not just being worked on domestically, it's being worked on internationally so you have to set priorities.

The challenge around waveforms. The challenges around standards. So I think that's kind of to point out what some of the challenges

are and to recommend some specific actions.

CO-CHAIR GIBSON: I think that what you're hearing is that the responses are in the context of the question. The question didn't say that these are a fait accompli so to speak. To the extent they're applicable, where can that be addressed?

So Bob, you'll have the last question and then I'll give it to Paige because we're running short on time.

MEMBER PEPPER: So, I want to go back to something Paige started with in her comments which is -- well this is a recommendation to NTIA.

There clearly are resource implications. The whole notion of -- and I completely agree about international coordination, advocacy, learning, get cetera, get cetera. I mean, that's absolutely necessary. And we probably don't do enough of that.

But there's also, you know, the recommendation that there be one person dedicated

to be running around the world talking to everybody, trying to synthesize this stuff and bring it all back, frankly I'm not quite sure how realistic that is and what the efficacy of that would be.

And I do think that the broader question, not just within the five recommendations here, but across all the recommendations that we're working on is at some point either NTIA or the committee working with NTIA, maybe it's a suggestion for the next round which is trying to identify both feasibility and impact for each of the recommendations. In other words to help set the priorities.

So what's the executable agenda that comes out of our recommendations broadly, and what are the linkages between them. Is there sort of an interdependency and a sequence.

In other words, do some things have to happen before other things. Maybe not. Maybe they're all sort of independent. But I think we need to think about that. And then there is the

resource impact.

So on the one hand I want to hear about, know more about what NTIA thinks the realistic -- how realistic is it that a recommendation would be implemented.

On the other hand, we should be making recommendations whether they're realistic or not. And so there's a tension there.

But I am concerned that the notion that we're going to recommend that there be one person designated as the international guru running around the world soaking everything up and advocating, and explaining what the U.S. is doing, and explaining back to the U.S. what the rest of the world is doing, I just don't think frankly that's realistic.

CO-CHAIR GIBSON: All right, thanks, Bob. Paige?

MS. ATKINS: So, I'll echo what Pepper just said. Resources. You know, something like this in particular you could eat a lot of resources in terms of standards and warranty, et

cetera.

So the more you can help us identify specific priorities as -- to include between, for instance, if you were to choose, not that we would, but if you were to choose between putting resources on being more cognizant of R&D around the world versus influencing standards, or within standards which are the most important bodies we would need to participate in.

And from a standards standpoint, for example, to me -- for us industry is our force multiplier. We can only do so much due to resource constraints in our reach. But how can we work with industry to then help industry influence the standards as well.

And it goes back to us perhaps setting the priorities, convening the groups and then being able to work with industry to force multiply for us.

So if you could think about that a little bit I think that would be helpful to us as we look at the recommendations.

I would say in terms of disclosure, open disclosure or waveforms, whatever the open waveform information terminology.

I do want to say something because it's often misunderstood. Just because something is on the internet doesn't mean it's not classified. So we have to be careful in terms of how we characterize what's classified.

I would recommend that we stay away from things are over-classified, NTIA should do something about it.

We've discussed similar issues before and that's not going to get us anywhere for what we need to do here I think at this point in time.

I would focus on not necessarily a policy that's related to open information, but then how do we abstract or create an envelope. I mean, we do that today in multiple venues, particularly as we're engaging internationally in the ITU forum.

(Telephonic interference)

MS. ATKINS: -- to enable better

sharing I think would be the focus.

And from an R&D standpoint the recommendation to become more cognizant is kind of a loose recommendation. What do we do? How do we do it? Do we do something through wizard, for instance, or do we -- other than identifying somebody that will engage is there a more concrete recommendation that could be beneficial to us as we look at cost-benefit across the different recommendations? Thank you.

CO-CHAIR GIBSON: All right, thanks, Paige.

I do understand there was some concern about number four, but I believe the intent of number four was that waveforms should be made available and the issue of classification should be taken into consideration.

So let me ask, do people feel we can vote on these as a slate of five? Okay, is there a motion to approve all five? With the changes as requested and mentioned in the meeting.

MEMBER ROBERSON: So moved.

CO-CHAIR GIBSON: There is a motion to approve. A second? Okay. Anymore further discussion? Okay, all in favor vote by saying aye.

(Chorus of ayes)

CO-CHAIR GIBSON: Any opposed?

(No response)

CO-CHAIR GIBSON: Any abstentions?

(No response)

CO-CHAIR GIBSON: Great. Okay, so the last but not least is Mariam with 5G recommendations.

Rob is on the horn. Is Rob going to be able to help you, or are you going to go solo?

MEMBER SOROND: I think Rob dropped off. Let me double-check. Rob, are you still on? I think he dropped off. Well, solo with help from other subcommittee members who contributed to this work.

So with that thank you very much for all the work that went into this. And also Rangam and Bob who participated on the calls and

provided good input.

Basically I just wanted to start by reading these one by one. No, I'm just kidding.

I wanted to start by saying that just talking about the question a little bit, just really briefly.

This question to us was really two stages. Because if you look at it there's a first part in the question that wants an identification task. Really it's saying what's unique about 5G. That is a task by itself.

And so we felt that we needed to complete that task, hence a report, hence the recommendations come with identifying that first.

And then the second step is what should the NTIA specifically do about it. So that's how the approach was.

So essentially there could be places where, okay, it's identified and the NTIA approach is not so much clearly defined because of what I'm going to get into next is the challenge that we face right now and during this

work is the nature of 5G.

And 5G is not defined. We put in a bunch of -- a lot of background into the report. You'll see later it's saying what are all the activities.

Industry is assuming 3GPP is going to standardize 5G work. Now I'm assuming that. But you know, we always go to these different workshops where people are saying well no, we're going to do this as well. So it might be a combination of things, a combination of work and a combination of groups.

So that's why the recommendations, you know, when you have an undefined concept in the recommendations at that point sort of have to go hand in hand with that undefined concept.

They will be at the preliminary stages where 5G is right now, at the preliminary stages.

So in other words there's definitely specific and immediate actions, but there's also obviously long-term actions with respect to these classifications. So I just wanted to say about

this work. And that's why we've outlined that obviously this is going to require future work.

And another thing about the question is that the question did not highlight a specific band whereas -- then it would help a lot with these recommendations as it defines to a specific band.

Of course with the caveat that 5G is still not defined. So we can't say do this thing about this thing that's not defined yet.

So, but at least it would give some of these frameworks that we're talking about about the unique identifiers and what's different than 5G a little bit more context if it were in regards to a specific band.

So with that said I mean just you know, kind of highlighting some key points on each of these recommendations and which ones are more sort of your generic type as opposed to the specific types and immediate actions.

Recommendation one is talking about deployment so that's a unique attribute of 5G.

That's the one that stands out. You're going to have because of IMT and because of the higher frequency bands, and because of the different types of coverage the deployment is going to be vastly different than 4G.

And that by itself is a bandwidth of sort of a lot of different things that are going to impact spectrum sharing.

The three bullets above are identifying certain things with this. I mean, this would be definitely actionable with respect to the specific band.

But right now they are essentially highlighting it's about where you're deploying, how you're deploying, and also this IMT concept, how that impacts things in the waveform. So that's sort of the first I'll call it the bucket of deployment scenario.

The second recommendation is talking about larger frequencies and bandwidths which becomes really relevant in just sort of spectrum in 4G and technologies before 4G were limited in

size to the extent that there was really -- now you're talking about gigahertz slots of spectrum.

So the dynamic has changed not only from the sense of a technology perspective the dynamics are going to change, but also from a sharing perspective. Obviously it changes when you have such bandwidths.

And that's why at least with some of the other recommendations, because as you're designing these technologies and 5G technologies or NTIA technology advancements this is an important aspect that needs to go into these designs.

So nothing can be done about it particularly now, unless the NTIA starts participating in standards which is laid out in the next recommendations. That's where the key difference is going to come in with respect to this particular one.

Recommendation three is new duplexing schemes. Currently all frequency bands are FDB2D, downlink only or uplink only.

They're going to have dynamic duplexing. They're going to have full duplexing. So, it's definitely going to make both challenging and less challenging in certain cases to be able to do sharing.

Recommendation four is the probability aspects. I think because there's flexibility with 5G deployment and 5G technologies this whole concept of let's look at the worst case and let's design everything around the worst case is going to limit everything on both sides.

So, we are saying that there needs to be an expansion of that concept into looking into actual realistic worst cases as opposed to worst cases.

Recommendation five and six is what gets into the immediate actions.

Five is the phase approach with upgrades. So if you have these undefined technologies I think the most immediate thing you can do is get yourself involved in it to be able to influence it one way or the other.

Because we really don't want to have 5G defined and then try to see how that -- what's unique about the sharing, as opposed to getting involved in 5G being defined and so that sharing works on the federal side.

So I think that a standards participation right now or public safety approach that's being done by the Department of Commerce. So as I've outlined before it's really good work.

This is not definitely an observed recommendation, it is to influence. And the reason why the industry won't be able to do that through the NTIA is because of reasons that we don't have -- for good reasons have knowledge of the waveforms, and the specific technologies, and things of the federal system.

So we won't be able to influence the standards bodies to reflect what the sharing that would help the federal systems, how to unleash that potential. So it has to be a direct NTIA involvement in this case in the standards bodies.

And then we are also talking about,

and then moving onto recommendation six I think is where this propagation modeling work, I think this is a recognized need.

The 4G system is sort of saying hey, you know, NTIA should consider doing this as soon as possible for 5G because it takes awhile to do this work and to be ready for these next steps, that's sort of an immediate action that requires the modeling work that is being done by ITS or other organizations to look at specific 5G modelings in the millimeter wave region, in the centimeter wave region.

So I think I'm going to stop right there. I'll see if first subcommittee members would like to weigh in. A lot of folks contributed.

CO-CHAIR GIBSON: Great job. Thanks for a succinct presentation. Okay, questions. Comments. All right, Paige.

MS. ATKINS: So, just to take a step back the initial question that we posed was focused on millimeter wave specifically and the

subcommittee asked that we take that out. So in retrospect perhaps we should have left it in to help focus the recommendations.

But that was what we specifically had requested so I just wanted to remind folks.

(Simultaneous speaking)

MS. ATKINS: But one of the best recommendations I'll say that I've seen is this propagation recommendation.

It is specific. It's something that we can take action on and something that we have been thinking about anyway. So, I want to thank you for trying to capture something that we can really take hold of and move forward.

One of the things that I would ask in general because there are a lot of recommendations that are not immediate and not really actionable at this time. It's something to think about or it's for the future.

I would ask that you try to focus on the near term actions that you want us to take. Not necessarily take the others out completely,

but really focus your recommendations on the near term and things that we can address and move forward.

One of the challenges I have with 5G and we talked about this in one of our meetings. It is everything to anyone.

And when we talk about things like IMT for instance, for me personally I try to conceptualize what's different with 5G IMT versus current IMT with 4G or other technologies.

And again, we were trying to focus on what would be unique that we would need to address for 5G specifically. So I ask you to think about that perhaps in a refinement of the recommendations.

I think the probability aspects, that is something that we are doing today to a large degree. That's what we're moving toward and have done with 3.5 and other activities.

So again, it's important whether it's unique to 5G explicitly or it becomes more paramount in 5G sharing. I'm wrestling with that

a little bit as well.

And the standards involvement. I know you said that there had to be government representation.

I think in my mind we still need to look at how we can leverage industry as well. It may be a government person, but we can't scale the same way that industry can. So methods by which we can work with industry to help us scale in terms of our influence in standards bodies.

And when you say in recommendation five you use the words investigate and encourage. I don't know what to do with that. So who am I encouraging? What does that look like? What does that mean?

So if we can just tighten up exactly what you had in mind in that area.

And again, the propagation limit is right on topic in terms of the kind of recommendation we're looking for. So thank you.

And thank you for all the great work. And even just having that definition for us, that

baseline definition as we move forward I think is going to be very important. So thank you.

CO-CHAIR GIBSON: Any comments?

MEMBER SOROND: Just to say thank you, very good feedback.

So we would like to be able to revise these recommendations to reflect what Paige has said. I think to a large extent it's definitely doable.

So, I guess for the July 15 date we want to plan on making sure that this happens.

I think though just on one particular one, on the 5G IMT versus 4G IMT I thought I want to come out and say this. I don't know if my colleagues would agree with this.

I would think really would be done in 5G the way it's envisioned. So yes, you could do 4G IMT. People are doing it right now. In fact, 2G, 1G, whatever IMT. But the idea of IMT in the large number of connections that is envisioned that's only a 5G concept. So that's the unique thing about 5G IMT that when you're talking about

connecting everything there's a limitation actually on 4G and previous technologies to be able to handle that number of technologies. But 5G is opening that to be able to do it.

So I can clarify that definition in there if that helps, but really to me it's like when I see IMT it just really is just 5G.

CO-CHAIR GIBSON: Well, your paper that accompanies this is actually, you know, it's like a tutorial on 5G. So you may be able to flesh that out. You flesh that out I think to some extent in the paper anyhow, right?

MEMBER SOROND: I think. I'll double-check.

CO-CHAIR GIBSON: If not --

MEMBER SOROND: The one in the recommendation or the paper? We can definitely flesh that out in the paper, but I was wondering if we needed to clarify that in the recommendation as well on that particular feedback.

MS. ATKINS: Let me re-look at the --

because that recommendation basically is just saying that you have to look at specific deployment models for the various aspects of 5G as they -- on a case by case basis almost in terms of how you would approach something.

So, the recommendation in general is not -- to me this is one of the ones that's not really an immediate action. It's more of a future approach. So, I'm not sure it really affects the recommendation. It's more of context. Unless there's something you have to do near term to address specific issues.

CO-CHAIR GIBSON: Do you have a comment, Dennis?

MEMBER ROBERSON: Yes, a couple. One, the conversation you just had around IMT I found very interesting. But I don't find it in your recommendations. Maybe I just missed it.

MEMBER SOROND: I think it's in the report. But that was my question. You're right, it's not in there, but I was just wondering where we had put it.

MS. ATKINS: Recommendation one is a reference IMT in terms of looking at deployment scenarios.

MEMBER ROBERSON: Yes, because I didn't see it any of the six recommendations. Yes. So that was the first comment.

The second comment for me, really in line with some of the conversations back and forth. I would agree with the notion of revising these.

I think at least for me recommendations three, four and six are pretty good as is, but one, two and five do seem very nebulous. It's like if you'd get down to the specificity of the ones. I don't know whether that resonates with you, Paige, or not, but that -- kind of going to the next double-click level on the -- that's where I came out for what it's worth.

CO-CHAIR GIBSON: Okay, thanks. So, thoughts on approving. Well, certainly six is a good one. Three, four and six, general feeling

that those are good and can be voted in? Is there a motion for three, four and six?

MEMBER TRAMONT: So moved.

CO-CHAIR GIBSON: Second? Any discussion? All right, let's vote on that. All approve three, four and six say aye.

(Chorus of ayes)

CO-CHAIR GIBSON: Any opposed?

(No response)

CO-CHAIR GIBSON: Any abstentions?

(No response)

CO-CHAIR GIBSON: Okay. So, if you'll work on one, two and five. And then with the comments then I think we'll be able to probably approve them at the August meeting.

MEMBER ROBERSON: And it doesn't say you can't do things with the other three that we just approved.

MEMBER SOROND: Yes, I was going to say we're going to probably --

CO-CHAIR GIBSON: You can probably tweak the others too with the comments, but those

were solid.

Okay, that's a wrap. Thanks, everyone. Where are we now? We're at public comment. Do you have something? Jennifer has a comment.

(Simultaneous speaking)

MEMBER WARREN: So my question was nobody else has submitted a report for approval here as Jeff and Kurt's group did.

And we asked for -- well, theirs was voted on and approved, but I understood it was approved where we could make some editorial changes.

(Simultaneous speaking)

CO-CHAIR GIBSON: So what's your question?

MEMBER ROBERSON: We did not approve the full report.

MEMBER WARREN: You did not approve the report.

CO-CHAIR GIBSON: Yes.

MEMBER WARREN: Thank you. That is

all I wanted.

CO-CHAIR ALDER: So just to clarify, I think we need to agree on these dates upcoming, that the idea was for people to submit their final reports.

Actually, as I look at the email that David sent out actually July 8 is the deadline for that. July 8. I misspoke when I said the 15th. There are some other things, but the reports are July 8.

I think that's actually necessary in order for the NTIA to have sufficient time for August 1. So July 8 is the date we're actually targeting for reports, any updated edits, Mariam that your group is going to make.

And I'd also like we also make that also the date for recommendations for future work as well. I just think we're going to need two or three weeks before August 1 in order to fit that all in.

So, July 8 for reports, edits and suggestion for future work if that works for

everyone.

CO-CHAIR GIBSON: You're done.

MEMBER DOMBROWSKY: Well, I am, but Paige said she was going to provide some clarification for ours.

MS. ATKINS: There were some inaccuracies in the writeup.

MEMBER DOMBROWSKY: So she'll give that to us.

CO-CHAIR GIBSON: Yes. They had a report too. Rick, do you have a comment?

MEMBER REASER: There was a lot of talk about priorities today, and NTIA priorities. So I have two comments.

One is that this might be a good topic. A lot of federal budget committees try to help the government figure out priorities, or give some suggested ideas for priorities. I think that might be something you might want to think about for next cycle.

The other thing I think it's important to do. Believe me, we know how strapped you guys

are. When Carl gave this thing, he said there's 100 people in my domain at OSM and only 25 of them actually do spectrum work. The rest are the janitors, the computer technicians. He made this speech one time about this. And so we know that you have a limited staff.

The question is that is there some way, maybe one of the things that you ought to look at is a way to augment the NTIA staff somehow some other way. Because you're not going to get more people, we know that. And unfortunately work just gets more and more.

Is there some way to -- like the FCC has these IWGs. There's all sorts of other ideas out there. But you might want to start looking at this, and then maybe get some of the federal agencies to pony up some time.

Because -- we had this meeting, the famous meeting at Stanford in the bar with Larry Strickling about the same thing. You're killing me. All these recommendations. I don't know if you guys remember that discussion.

And so all we're doing is we're creating more work for you. So we became very, very sensitized to that for about a year. And then we kind of blew that off.

MEMBER ROBERSON: Some people did.

MEMBER REASER: Well, we did. Some people, and some people didn't.

I guess that would be my observation. Maybe there's a way to somehow have some mechanisms to allow others to help you do this. Obviously you'd still need to be in charge and set the tone and the rules, but you're right, all these things we're telling you to do, you don't have the people to do that.

You're not going to get some magic appropriation that says oh, we're going to increase the NTIA staff by three times. That's not going to happen.

So, maybe we can help. Maybe your federal guys can help with the prioritization, some ideas about that. And maybe some ideas about how you can leverage the greater community

to help you with that. Not just industry, but maybe some other kinds of mechanisms. That's my thought.

CO-CHAIR GIBSON: Did you want to make a comment, Glenn?

MR. REYNOLDS: Yes, Carl, I appreciate that. And in fact I was going to try to say something along those lines even before you commented.

Look, I think there's great value in putting as many of these ideas and all this great thinking on the table as you can.

NTIA is a very, very small agency and this is my channeling of Larry. A lot of the work we're talking about here is done at the OSM.

A lot of the work that you guys have raised is done through our ITS group.

The vast majority of our work at ITS is actually funded through -- by outside resources either in the industry or today mostly by other agencies.

So, I think it's just -- I appreciate

that thought because, yes, there's no additional money coming in. Budgets aren't going up to deal with this.

And I think I would throw it back to this group and say look, if these are really important priorities thinking about how we find the money to do them is essential.

And so we'd love to have that conversation and come up with ideas outside the box.

CO-CHAIR GIBSON: All right. Thanks, Glenn.

We're at the opportunity for public comment. So is there any comment from the public in the room? I take that as a no. And anybody on the phone?

Okay, then from the comment standpoint from the chairs you did great work. We got the meeting done on time which is always good.

But I think the quality of the presentations and discussion is sort of testament to the quality of the people doing the work so

thank you.

I've been on most of the calls which is a challenge in and of itself, but I've heard the discussions go on.

And like for example the 5G. I'm not singling that out because it's better, but it's an example of the quality of the discussion that's going on. The sharing and the measurements. It's great work, it's great to be part of it.

So thank you all for everything you do and the time you spend on this.

CO-CHAIR ALDER: Is there any other questions about timing and what's next? Everyone is coming August 1?

CO-CHAIR GIBSON: We're adjourned. Thank you all.

(Whereupon, the above-entitled matter went off the record at 3:38 p.m.)

C E R T I F I C A T E

This is to certify that the foregoing transcript

In the matter of: Commerce Spectrum Management Advisory Committee Meeting

Before: US/DOC

Date: 06-08-16

Place: Washington, DC

was duly recorded and accurately transcribed under my direction; further, that said transcript is a true and accurate record of the proceedings.

Neal R. Gross

---

Court Reporter