U.S. DEPARTMENT OF COMMERCE

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COMMERCE SPECTRUM MANAGEMENT
ADVISORY COMMITTEE (CSMAC)

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MEETING

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THURSDAY
JULY 30, 2020

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The Advisory Committee convened via teleconference at 1:00 p.m. Eastern Time, Charla Rath and Jennifer Warren, Co-Chairs, presiding.

MEMBERS PRESENT

CHARLA RATH, Independent Consultant; Co-Chair
JENNIFER WARREN, Vice President, Technology Policy & Regulations, Lockheed Martin Corporation; Co-Chair
CLAUDE AIKEN, President and CEO, Wireless Internet Service Providers Association
MARY BROWN, Senior Director, Spectrum and Technology Policy, Cisco
MICHAEL CALABRESE, Director, The New American Foundation, Wireless Future Program
JEFF COHEN, Chief Counsel and Director of Government Relations, APCO International
MARK E. CROSBY, President and CEO, Enterprise Wireless Alliance
H. MARK GIBSON, Senior Director, Business Development, CommScope
DALE HATFIELD, Senior Fellow, Silicon Flatirons Center for Law, Technology, and Entrepreneurship

CAROLYN KAHN, Principal Economics and Business Analyst/Group Leader, The MITRE Corporation - Center for Acquisition and Management
PAUL KOLODZY, Consultant, Kolodzy Consulting, LLC
MARK LEWELLEN, Manager of Spectrum Advocacy, John Deere Intelligent Solutions Group
JENNIFER MANNER, Senior VP, Regulatory Affairs, Echostar
MARK McHENRY, Founder and President, Shared Spectrum Company
DONNA MURPHY, Senior VP, Global Regulatory, INMARSAT
WAYNE PHOEL, Independent Consultant, Previous MIT/LL and DARPA
CARL POVELITES, Assistant Vice President of Public Policy, AT&T
DENNIS ROBERSON, Research Professor of Computer Science, Illinois Institute of Technology
ANDREW ROY, Director of Engineering Services, Aviation Spectrum Resources
MARIAM SOROND, Vice President Technology Development, Dish Network LLC
BRYAN TRAMONT, Managing Partner, Wilkinson Barker Knauer, LLP
CHRISTOPHER WEASLER, Global Head of Spectrum Policy and Connectivity Planning, Facebook, Inc.
ROBERT WELLER, VP for Spectrum Policy, National Association of Broadcasters

ALSO PRESENT
CHARLES COOPER, Associate Administrator, Office of Spectrum Management, NTIA
DOUG KINKOPH, Associate Administrator, performing the non-exclusive functions and duties of the Assistant Secretary of Commerce for Communications and Information
DAVID REED, Designated Federal Officer
ANTONIO RICHARDSON

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

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

(1:00 p.m.)

MR. KINKOPH: Well, good afternoon, everybody.

I just want to thank you all for joining today's CSMAC meeting.

Hey guys, can we mute?

We continue to be pleased by how much collaboration and significant progress that's taken place in our virtual environment, and of course, we want to thank you for your patience and diligence during this difficult time.

At NTIA, our focus remains on making sure there is sufficient spectrum to meet the demand for 5G networks and other advanced services on the ground and in the sky, while ensuring the government agencies have the spectrum they need to fulfill their important statutory missions.

U.S. leadership in 5G and in space are two core priorities of this administration.

Earlier this month, we delivered a report to Congress summarizing our assessment of

3100 to 3550 megahertz frequency range.

This report mandated in the MOBILE NOW Act followed our previously released technical assessment on the feasibility of spectrum sharing among federal and non-federal users in this band.

At the same time, we noted that the administration's preference is to clear or relocate incumbent systems where possible.

As all of you well know, this band presents a difficult challenge in the United States because it has long been employed by the military for important radar systems that we rely on to keep this country safe.

We are proceeding with both a sense of urgency, as well in understanding that if we do not plan and execute successfully, we risk a major setback for our program if harmful interference to national defense systems occur.

Our report to Congress came to two principle conclusions.

One, the 3450 to 3550 megahertz sub-band is a good candidate for potential spectrum

sharing, including at the commercial power level sought by the wireless industry.

Second, although sharing may be possible in portions of the 3100 to 3450 megahertz band, there must be more detailed analysis of potential sharing mechanisms, and even possible relocation of incumbents from some portions of the band.

Currently, we are moving forward aggressively on the work needed to make 3450 to 3550 available as rapidly as possible.

Moving forward, we will also continue to explore options with respect to other segments of the full range as we understand the effectiveness of these mid-band frequencies, and our cognizance of developments from a global perspective.

Just a week ago, the FCC began to auction licenses in the CBRS services, which has extensive roots in cooperation between NTIA, the FCC, and Department of Defense, and the industry.

This very type of cooperation is what this group embodies.

In fact, CSMAC was instrumental in pioneering the combination of relocation and sharing in the AWS-3 process that made 4G a huge success in our country.

So with your help, we will continue to press ahead in developing new and innovative approaches to spectrum management, including the kind of spectrum sharing and other repurposing techniques that we need to achieve all of our nation's goals.

I'm excited to hear today's status updates from the subcommittees, and I look forward to following your ongoing efforts in the stretch drive of this cycle.

As always, I welcome any of your questions, views, and requests.

Let me know if there's anything we can do to help support your work, and personally, I want to thank you all.

So thank you for your work, and I will turn it over to the co-chairs. Back to you, ladies.

CO-CHAIR WARREN: Thanks, Doug.

Charla, do you want to kick off? And then I'll do the roll call? Or shall I start with roll call?

(No audible response.)

CO-CHAIR WARREN: Charla may be on mute, so let me just go ahead and welcome everybody.

And we're going to go through roll call, which we hope will be a shorter process than last time.

And I'm going to just do roll call for those who have not indicated they will not be able to participate.

So, we're hoping that as I call your name, you will be able to say you are with us.

So, Claude Aiken?

MEMBER AIKEN: I am here.

CO-CHAIR WARREN: Thank you. Mary Brown?

MEMBER BROWN: Here.

CO-CHAIR WARREN: Michael Calabrese?

MEMBER CALABRESE: I'm here.

CO-CHAIR WARREN: Jeff Cohen?

MEMBER COHEN: I am here.

CO-CHAIR WARREN: Mark Crosby?

MEMBER CROSBY: I'm here.

CO-CHAIR WARREN: Tom Dombrowsky?

(No audible response.)

CO-CHAIR WARREN: Thomas, you there? Do you need to come off mute?

(No audible response.)

CO-CHAIR WARREN: Okay. Mark Gibson?

MEMBER GIBSON: Here.

CO-CHAIR WARREN: Dale Hatfield?

MEMBER HATFIELD: I'm here.

CO-CHAIR WARREN: Carolyn Kahn?

MEMBER KAHN: Here.

CO-CHAIR WARREN: Paul Kolodzy?

MEMBER KOLODZY: I am with us.

CO-CHAIR WARREN: Mark Lewellen?

MEMBER LEWELLEN: Present.

CO-CHAIR WARREN: Jennifer Manner?

MEMBER MANNER: Present.

CO-CHAIR WARREN: Mark McHenry?

MEMBER McHENRY: Here.

CO-CHAIR WARREN: Donna Murphy -- Donna Bethea-Murphy?

MEMBER MURPHY: Here.

CO-CHAIR WARREN: Wayne Phoel?

MEMBER PHOEL: Here.

CO-CHAIR WARREN: Carl Povelites?

MEMBER POVELITES: Here.

CO-CHAIR WARREN: Mark Racek?

(No audible response.)

CO-CHAIR WARREN: Mark Racek?

(No audible response.)

CO-CHAIR WARREN: Okay. Charla Rath?

CO-CHAIR RATH: Here.

CO-CHAIR WARREN: Excellent. Dennis Roberson?

MEMBER ROBERSON: Present.

CO-CHAIR WARREN: Andy Roy?

MEMBER ROY: Present.

CO-CHAIR WARREN: Mariam Sorond?

MEMBER SOROND: I'm here.

CO-CHAIR WARREN: Bryan Tramont?

MEMBER TRAMONT: I'm sorry, that's

attorney meeting to you. Yes, I'm here.

I thought that was funny. Come on, guys. Okay, fine, be that way.

CO-CHAIR WARREN: You know, we just wanted a smooth roll call.

Chris Weasler?

CO-CHAIR RATH: No Bryan, we're all on mute, so you couldn't hear us laughing.

MEMBER TRAMONT: Very good. My --

CO-CHAIR WARREN: Okay. Chris, we --

(Simultaneous speaking.)

MEMBER WEASLER: Hi, it's Chris. I'm here.

CO-CHAIR WARREN: Hi Chris. Sorry for making that hard there.

MEMBER WEASLER: No problem.

CO-CHAIR WARREN: Bob Weller?

MEMBER WELLER: Good afternoon.

CO-CHAIR WARREN: Hi Bob. And then myself, of course, Jennifer Warren.

So, that is our attendance. Did I not

call someone who is on the CSMAC?

Is there anybody whose name was not called, or they're just now getting off mute?

MR. GARCIA: This is John Garcia, from Boeing. I'm sitting in for Audrey Allison.

CO-CHAIR WARREN: Glad to have you be in the public.

Audrey indicated that she would not be with us, so thank you.

MR. GARCIA: Great.

CO-CHAIR WARREN: And so with that, we're done on the roll call.

And I wanted to welcome everybody, and Charla, would you like to say any words?

CO-CHAIR RATH: Only what we say every time about this group.

It's you've all been incredibly diligent about addressing these issues, and, you know, I know both Jennifer and I, and also, you know, folks at NTIA really appreciate it.

And I'm looking forward to hearing the reports, and, you know, I know we're going to finish

some things up today, and we've still got a few other things in the pipelines.

So, Jennifer, anything?

CO-CHAIR WARREN: No, I echo what you said, you know, but we do have three reports and one status update.

So, I think that's a testament to the -- you know, we're on time, we're on the time that we established pre-COVID, which is, you know, really a testament as Charla said to the dedication of all the participants on the CSMAC, all the advisors on the CSMAC.

So, again, thank you for that.

And with that, I think we're going to first, before we get into those reports and discussion -- and by Charles, Charles Cooper, the associate administrator of OSM -- to provide us with the spectrum policy update that we've come to look forward to every meeting.

Charles?

MR. COOPER: Thank you, Jennifer, for the introduction.

And thanks everyone for joining us via teleconference today.

We continue to hope that all of you and all of your family members are well, and we thank you for your participation in all the work in CSMAC.

And I also appreciate Doug for his introductory remarks highlighting the progress we have made on spectrum policy and management improvements.

Taking his lead, I'm happy to provide you with a full spectrum update for this afternoon, affirming our commitment to the critical importance of our spectrum-based federal operations, and also our commercial industries.

So let's start off with the update on the mid-band, the 3 gigahertz.

As I noted during the last CSMAC meeting, finding valuable spectrum that the industry can use for 5G networks and services is a high priority goal of this administration, as it is for Congress.

As Doug mentioned earlier, NTIA

submitted their report to Congress as pursuant to the MOBILE NOW Act on the potential for making available spectrum 3100 to 3550 megahertz band for commercial wireless services.

And that report follows our earlier technical report over this year, in which we are pleased to lead the way on identifying the potential of the 3450 to 3550 megahertz sub-band.

Both the technical report and the MOBILE NOW report conclude that the 3450 and 3550 sub-band could be repurposed for commercial use, while still retaining military capabilities for key radar systems.

As you know, we want to be careful in opening up these bands for non-federal use, as they currently are used by Department of Defense for aeronautical, maritime, and land-based data operations.

Our experience with other bands is teaching us a mix of attractive techniques to free up spectrum, while still protecting critical federal capabilities.

While we always look for clearing, a combination of summary locations were feasible, and innovative spectrum sharing methodologies can be the most expeditious and least costly way to accommodate those federal and non-federal uses.

In fact, this kind of combination has already been employed in such recent successful repurposing efforts, such as the AWS-3 and the 3550 to 3650 portion of the Citizens Broadband Radio Service, otherwise known as CBRS.

So speaking of CBRS, let's talk a little bit more about that one.

The CBRS auction commenced just about a week ago.

The commission is auctioning the priority access licenses, known as PAL.

Following the introduction of the General Authorized Access, GAA, licensed by rural operations earlier this year.

The auction, following on the GAA launch, represents a watershed moment in the development of dynamic sharing mechanisms.

We have remained actively engaged in CBRS development working with the providers and operators of SAS and ESC equipment to help fine-tune the new capabilities as they are implemented in networks and systems in the dynamic protection areas.

Notably, an informal industry government collaboration group has been instrumental in helping develop it and now implement these technologies.

Meanwhile, NTIA's Institute of Telecommunication Sciences, otherwise known as ITS, is working with the FCC and Department of Defense on the SAS and ESC certification testing.

With the 3.5 gigahertz band coming online, commercial systems will be able to grow and flourish throughout most of the top half of the 3 gigahertz mid-band range.

This is due to CBRS, and of course because earlier this year, the commission adopted an order setting aside 280 megahertz of their C-band in the 3.7 to 3.98 gigahertz segment for flexible

use, including 5G services.

The FCC has signaled its intent to auction the C-band spectrum later this year, creating a large, continuous block of mid-band spectrum from the 3550 to 3980 megahertz for licensed services.

Additionally, the FCC in April made 1200 megahertz of spectrum available for unlicensed services, including Wi-Fi 6 in the 6 gigahertz band.

Collectively these actions continue to expand the opportunities to provide broadband wireless services to meet consumer demand in this mid-band range.

Although wireless carriers will continue to prefer exclusive use of spectrum, that is not going to be possible in every use case, particularly if we need expedited spectrum access.

Our ongoing work to develop an incumbent and foreign capability, what we call the IIC, that can ultimately be truly automated, is intended to facilitate innovative and seamless

spectrum sharing.

It would allow a federal agency to provide updated information on a specific use of a given band in this geographic area through a database and portal system.

This would allow more dynamic sharing of spectrum with more precise identification of exact times and the actual spectrum that would be used.

The federal agencies, in their part, would be able to input the most accurate and timely data on their own spectrum usage, giving them greater control over presenting potential interference scenarios.

NTIA will work with our agency partners to develop and refine this concept.

Although this remains in the planning and discussion stages, we are excited about the IIC, and more generally about the movement of automated spectrum management services.

Related and building to that point, NTIA continues to embark on efforts to modernize

our own internal spectrum management IT systems.

We are excited about our vision to evolve our spectrum management tools.

That has received widespread support from the administration and Congress, to industry stakeholders, who all agree that investments in this space will bring important returns in terms of shoring up the foundation for the future of our effort to manage the critical spectrum services.

So in conclusion, I'd like to say my thanks for all of you for the hard work you've done in these challenging times.

With your help, we will continue to look for new ways to improve our spectrum management techniques and capabilities.

As always, I welcome your suggestions on how we can further support our working together, particularly as we continue to adapt to more online ways of working.

I look forward to discussing the full report today, and I will now hand the proverbial

mic back over to the co-chairs. Thank you.

CO-CHAIR WARREN: Thank you, Charles.

I think we can, if you're willing to open it up to the CSMAC members to see if there are any particular questions and follow up to your update?

That was very helpful.

Does any CSMAC member have a question for Charles before we get to the actual report?

I see Mark Gibson. Mark?

MEMBER GIBSON: Yeah, hi. Thanks, Jennifer.

Charles, I just wanted to say thank you from a SAS provider for all the work that NTIA has done to help make CBRS a reality.

I just checked the spectrum auctions right now, and they're about 750,000,000, and NTIA is highly responsible for the success of the band.

So, thanks to you, people like Ed Drocella, Bob Cole (phonetic), Nick Lathorty (phonetic), and all those.

The collaboration's been great, and I

just wanted to say thank you for the work you guys have done on that.

MR. COOPER: Yes. Thank you, Mark.

It's been a resounding success, and absolutely the dedicated folks within the Office of Spectrum Management that you've already identified, also in collaboration with our institute located in Boulder, Colorado, ITS, has made this a successful effort thus far, and we continue to remain hopeful in the auction.

So thank you, Mark.

CO-CHAIR WARREN: Are there any other questions, comments, compliments that any CSMAC member would like to offer? I'm sure all are welcome.

If not, we will move to the report. I'm just giving everybody a chance.

(No audible response.)

CO-CHAIR WARREN: Okay.

Then, we will go to the first report, and that's from Working Group 1, and Jennifer Manner will kick us off. Thank you.

MEMBER MANNER: Thank you, Jennifer. Just can everyone see the slides?

MR. REED: Yes, I can see it.

MEMBER MANNER: Okay, perfect, thank you.

So, thank you Jennifer and Charla, and Charles, thanks for your remarks.

I certainly support the thanks to NTIA.

So on behalf of Mary Brown and Working Group 1, we're very happy to present today our final report on our very important mission.

And so, we're going to walk through this, and then Mary, at the end of the presentation, is going to talk about perhaps the next steps, official action that we can take as a working group, so we look forward to that discussion, as well.

So, when we started we were given a very specific mandate, which is looking at a government's model for the National Spectrum Strategy, and what should the implementation be?

We of course didn't have a National Spectrum Strategy, so we spent a fair amount of

time looking at what structures are available.

And we do believe that there's utility in looking at revising the spectrum management approach, so we spent a lot of time working through this, and we're very happy to present our results today.

Sorry, wrong way.

I just wanted to start out, and I think this is our third time we've presented this, but we started out with a general view of what our mandate was, and we generally agreed among ourselves that the current approach for managing spectrum really is no longer effectively serving the stakeholders, and really needed to be looked at for some reform.

And that's especially with the increase of spectrum usage by every stakeholder, and that is the time to really look at how we manage spectrum, how we share on that spectrum, the impacts on brand adjacencies, and making sure that the U.S. was really making the most of what it has in terms of spectrum management resources.

So we're hoping that our report will provide some insight and guidance on that.

Our working method, we've held over 15 meetings, so I actually think (telephonic interference) there.

We've held a legal review, we've had some folks take a look at international.

We've received contributions from members, both on our working group and another working group, so I think almost everyone in the CSMAC is a member of our group.

Looking at developing a really reasonable array of different government model options, and I do think we've achieved that.

We had the opportunity to host Peter Tenhula, who came in and talked to us about the IRAC, which is really important.

Some (telephonic interference) the University of Colorado law students certainly helped us understand the history, and then really here you'll see that this method is I think fairly all encompassing.

It's been reviewed extensively by our working group, but also by all the CSMAC members, and we've incorporated those (telephonic interference).

CO-CHAIR WARREN: Jennifer?

MEMBER MANNER: Yes?

CO-CHAIR WARREN: I'm sorry to interrupt, it's just a procedural matter.

There are two squares that are blocking the views of your main chart, or one square that's blocking the view of your main chart.

There you go. Thank you.

MEMBER MANNER: Okay.

Now, of course, I can't get my settings to change.

Okay, thank you. So, I'm going to see it the wrong way, and you see it the right way. That works.

So I apologize. So with that, I'm going to turn the floor over to Mary for this next portion.

So, Mary? And just tell me when you

want me to go to next slide.

MEMBER BROWN: Okay, I will. Thank you, Jennifer. And thank you everybody.

As Jennifer said, in the absence of the National Spectrum Strategy sort of inform this exercise, we essentially approached the problem of spectrum governance in almost a whiteboard fashion, throwing out what we thought might be reasonable ideas or good ideas for how spectrum governance might be reformed.

And we didn't put any limits on ourselves.

We decided to be very open to any idea, even if that idea ultimately might be difficult to achieve, or even if subsequently we found issues with an idea.

We really thought that because there were no sort of extensive literature on the question of spectrum governance, that this was really an opportunity to sort of begin a conversation around spectrum governance by showing people different ideas that the working group had about ways in which

there might be reform.

We are not endorsing any of them. We're not endorsing all of them.

We're just presenting them in our report, and let leaders go through and decide what's good and bad about them.

We tried to do a little bit of an identification of what's good and bad about them, or issues with them, I should say.

But it's really sort of, you know, writing on a blank piece of paper.

And it was a very interesting exercise, and I think we all learned a lot.

And so, what we've come up with is essentially what we showed you last time.

We have several proposals to stand up a new agency that would take over spectrum governance.

We have two proposals to repurpose and expand the authority of either NTIA or FCC. We call those new FCC, new NTIA.

And then we have a series of proposals

that could attach to other options or stand on their own.

So, these are pretty much what you saw last time, and I will walk through them one more time for everyone.

So we'll start with proposals to stand up a new agency. Yes, you can flip to the next slide.

And the first one is what we're calling the new Full Service Spectrum Agency, and that is an organization that would perform all spectrum policy management planning, licensing authorization, equipment functions, sharing, enforcement.

If it has to do with spectrum, it would be in this agency.

It has been envisioned as something that would have a board of directors, of commissioners.

We are thinking that those commissioners would need some form of spectrum expertise in order to be able to be nominated and

approved for this role.

And essentially what we're talking about here is the existing spectrum functions currently performed by FCC and NTIA would be vested and assigned to this new entity.

So, this would become the single place where one would go for anything having to do with spectrum and wireless.

So, we've listed here all of the different spectrum management services -- oh, getting a little bit of feedback there.

And important to us was the notion that within this agency there would be coordination offices for all stakeholders, because this would be responsible not just for federal use and governmental use of spectrum, but also for commercial use, as well.

Jennifer, if you could flip to the next slide?

So, a variant of a new agency, of course, the prior one was looking at all spectrum functions.

This is even more aggressive. The idea is to pull the NTIA and FCC together in a new unity agency.

And this would include both spectrum and non-spectrum functions.

And so, potentially what would happen is the NTIA and FCC would come under this new entity as offices of the new entity, right?

So, they'd sort of be subsidiary agencies at first, and report up to the new unity agency.

So, the decision-making here, this is important.

And this idea would revert to a single administrator.

And it would be the administrator who ultimately makes the decision, not just about spectrum, but about anything.

Again, we've listed all of the functions that would be performed by the new unity agency, at least with respect to the spectrum part, right?

And obviously, in this one, we are proposing that the new unity agency would be part of the executive branch, and the administrator model would be sort of borrowed from other independent federal agencies, such as the Environmental Protection Agency, where the administrator has a term of office that does not coincide with the term of the president, so they would have some distance from the Office of the President with respect to spectrum policy-making.

Okay, let's flip to the next one.

The third independent agency idea goes in the other direction, from fully integrating the agencies. This is a Spectrum Resource Agency.

And the emphasis here is on a smaller agency that would perform sort of top-level spectrum governance and policy decisions.

So here, you see a much more limited set of objectives that the Spectrum Resource Agency would perform relative to the two prior options, but would be limited to planning and allocation, international policy, including treaty negotiation

and border coordination, research and development needs, forecasting, et cetera.

So NTIA and the FCC would remain as they are today, with the exception of planning and allocation and international policy, which would be taken over by the new SRA.

So all the spectrum assignment mechanisms on the FCC side -- licensing, auctions, et cetera -- on the NTIA's side, federal assignments -- that would all remain in place.

Equipment authorization and enforcement remain within the domain of the FCC for commercial uses, and to the NTIA for federal assignment holders.

And again here, we're proposing that under this idea, the agency would be led by an administrator, so again, another allusion to the EPA type model.

It would fit in the executive branch, but the administrator would run an independent agency within the executive branch.

So that is a much more streamlined

version of a new entity that could take over spectrum governance.

Okay, next slide.

Obviously, we have two agencies that today are part of the spectrum governance process, so as a thought exercise, we took a look at both of them and said, well, what if we consolidated spectrum management responsibilities into one or the other?

So, with respect to the FCC, we said there's a new FCC, and it would inherit all the spectrum management responsibilities for the federal government, adding to its current portfolio on the commercial side.

And so, you see the activities listed on this slide.

It would include full planning and allocation of spectrum international policy, and we're also proposing that the new FCC add a research and development component on spectrum and forecasting.

The balance of the NTIA and the FCC work

in its radio spectrum and wireless would remain.

So, NTIA would continue to hand out federal assignments, the IRAC would continue in NTIA, the FCC would of course continue its assignments and auctioning processes as they do today.

As we pointed out last time, there are some issues with this.

This is obviously a huge change in the FCC's portfolio, and it would require the FCC to become very smart about things like national security issues associated with the federal side.

The FCC is also going to have a lot of federal stakeholders for the first time, and so that really would require a much more expansive operation in order to be able to stay on top of planning and allocation decisions that would adequately meet all stakeholders' needs.

We did point out in our written report that we need to think some more about whether this is a workable idea, in that the FCC as an independent agency reporting to Congress would be telling the

national defense apparatus what its spectrum allocation would be.

And there might be mechanisms that would allow that to happen in a reasonable way, but it does raise the question of whether that government structure actually works for certain aspects of spectrum usage.

So we recommended that that issue be probed a little bit more before deciding that this is a good idea that should march forward.

Okay, Jennifer, if you could move to the next slide?

Okay, so then the converse of that is NTIA, they would take over all spectrum management responsibilities from the FCC, and the same issues there that the FCC would take on.

CO-CHAIR WARREN: Could folks go on mute, please?

MEMBER BROWN: Okay, I'm going to keep talking as long as people can hear me, Jennifer.

Hopefully we can get this situation

under control.

So, the new NTIA obviously would have a greatly expanded mission, in that they would now be responsible for the entire commercial stakeholder community.

Okay, this is really getting hard to speak.

CO-CHAIR WARREN: Yeah, Mary, just a moment.

Antonio, can you mute the interfering line?

MR. RICHARDSON: Yes, I'm in the process of doing it now.

CO-CHAIR WARREN: Thank you. Back to you, Mary. Sorry about that.

MEMBER BROWN: Hey, thanks. No problem.

We've all had this fun on many conference calls over the past (telephonic interference).

So, obviously the NTIA would have a much expanded portfolio in that it would now be

responsible for planning and allocation for the commercial side.

And that's going to entail new responsibilities, and we recommend in the report that in the event you were to go down this road with this plan, you would probably want to elevate the NTIA within the Department of Commerce structure, given that it would have the responsibility for all spectrum and all of the GDP associated with that spectrum.

It would seem that you would want to elevate that.

And then, of course, all the licensing, equipment authorization, et cetera, functions would remain as is under this approach, as well.

Okay, Jennifer, I think that brings us to the stand-alone option.

MEMBER MANNER: So thank you, so I'll take it from here. So these are stand-alone or options that can be combined.

The first one we have is the research and development arm, and one of the areas that the

working group (telephonic interference) that there's several areas that really are not addressed, or haphazardly addressed on spectrum management, and that includes, you know, data gathering function, you know, not just on-demand, but also on technologies and utilization of spectrum, information on growth, understanding things like radio propagation and doing modeling.

Sharing methods are becoming in particularly important.

So, I think the group thought we needed to at least highlight that there is a need for some sort of research and development function, and where that could be.

Would that be stood up within an agency, or would it be an administration of an internal or external work program with something that we didn't make a recommendation on?

But we did want to raise the importance of this.

I think we spent a lot of time really recognizing the need for some sort of research and

development function.

In one of the other agencies that we talked through, Mary, or functions, or whether it's a third party, or an external research and development program.

The second one really grows on something that's been in place now for years and years.

The most recent MOU between the FCC and NTIA, which is really on how to work together in the spectrum world, is almost 20 years of age.

And so, it's really time to relook at that.

We also suggest that it get relooked at more systematically, maybe every two years.

And having a more set (telephonic interference) for coordination for routine items, and enhancing the MOU to address non-routine items.

I think a number of us have experienced situations when the agencies are coordinating, and (telephonic interference) for a while, so we

thought this was an important process that really needed to take some time and be looked at, formalizing the development of a government structure.

Perhaps providing Commerce a report might actually be helpful to make sure that, you know, there's transparency on what's outstanding, especially where areas can't be found, where there's no consensus that's been reached.

Then the other thing, we really were hopeful this would also be a way to look at new ways to implement technologies that enhanced the spectrum use.

We thought perhaps as part of this, there could be an annual joint workshop to discuss spectrum research and coordinate, set the metrics that could be agreed on to predict harmful interference.

And even a recommendation we like to make is to create a federal advisory committee on spectrum planning and usage, which is comprised not just of federal, but also non-federal

stakeholders.

And we saw this as a way to develop collaboration and strategies between both federal and non-federal users.

This is one that I'd like to point out has no legislation required.

This is something that could be accomplished today, if FCC and NTIA so chose.

In terms of the other options -- these are just a couple -- certainly we felt that no matter what happens, there is a need to review spectrum management periodically.

And then, two ways we just identified through our discussions of these other options that we felt would be considered to improve existing processes.

One was -- and this will have to wait until perhaps we're past the pandemic -- but it's co-locating the FCC and NTIA in the same office complex.

We think increased communication really helps in line with the next increase

(telephonic interference).

We know that when there's detailees from NTIA or FCC, and the other agency, I think that area of communication certainly increases, and there's a better understanding.

So, more cross-pollination.

And then the other thing we would recommend in light and hope that there will be restructuring at some time, is that most spectrum responsibilities in this agency end up in one (telephonic interference), so that if there is a reorganization, it's a pretty easy total, so you don't have to go to all the different organizations that exist today.

So these were just a couple of ideas, and then Mary, I'm going to turn it back to you for (telephonic interference).

MEMBER BROWN: And before I cover this slide, there was one more thing I wanted to mention on the research and development option, which is it ties very directly into our colleagues' and Working Group 2, Member Gibson's group, concerning

data and the need to try to generate data about how spectrum is being utilized by various radio systems, and so forth.

So we saw a direct tie in there as we discussed that option with the work of our colleagues in Working Group 2.

So, I just wanted to take a minute to sort of review what we learned in this process, separate and apart from the list of sort of whiteboarded options that might be reviewed further, or might be a basis for reform, or at least would be a basis for further conversation.

So, one thing we learned is that there are hints in various historic documents that governance reform has been considered.

We found them in various places, but the written record of what would be proposed, or the rationale, the ideas, is pretty slim, in so far as we have been able to determine.

And the other thing was there's really no comprehensive history that you can just go to to explain the current government structure.

The history is there, but it hasn't been organized or synthesized in any way.

And so, what this working group has done is really written down for the first time some possible ideas on which this conversation could go forward, and I think that's a significant contribution to thinking about whether we can do this better.

Just having the ideas out there, whether there's aspects of the ideas that people think are good, or aspects of some ideas that people think are not so good.

Just having it written down in one place is a significant advancement over what we have so far.

So, the other thing we learned is that by simply putting options up on a whiteboard essentially has enabled us to have pretty useful insight into the benefits or the possible pitfalls of various reform ideas.

I don't think any of us are putting these ideas out there as these are the only ideas

that you could use to reform spectrum governance, but these are ideas that help spark conversation that may lead to other ideas, or may lead to modifications of these ideas.

And by writing it all down and letting people reflect on it, it does give you some insights into what might work or what might not work, or issues that would have to be resolved.

So that was incredibly useful, I think.

And then, the work product that we generated, sort of the report that we've generated, it's I think a very significant step in that now that it's published out there on the NTIA CSMAC website, it really does invite broader consideration by the spectrum community of what good governance might look like going forward, what sort of should we change?

And so, my hope is that this doesn't just sort of end up being a dry CSMAC working group report, but that it sparks further conversation among people in the community, among (telephonic

interference), and others about what would be helpful.

As Jennifer pointed out, virtually all the institutional reform that we discussed are going to require statutory changes.

And almost everything we looked at, that is significant -- a significant alteration of the current structure requires going back to Congress and getting them to enact something.

And that is a pretty big barrier. Okay.

And that is we recognize, you know, a significant barrier, but one that, you know, if the benefits are great enough, no one should shy away from it.

So, we didn't shy away from it, and we don't think anybody else should shy away from it either.

Now, for all of these options, additional policy development work is going to be needed to narrow the field or select the best option.

And we said we did not have the benefit of the National Spectrum Strategy to sort of filter these ideas and say, okay, the National Spectrum Strategy policy is whatever it is, let's filter these ideas against that and see how they stack up.

We didn't have that.

So, in the absence of that, one would have to define some criteria -- my goodness, this is really (telephonic interference).

(Simultaneous speaking.)

MEMBER BROWN: In the absence of the National Spectrum Strategy, one would actually have to develop some criteria or some evaluation mechanism that would have to be present in order to be able to take these or any other options and essentially filter them or evaluate them.

And so, so that work was not done in the year that we had, or actually slightly less than a year, nine months that we had.

But that worked either against the National Spectrum Strategy or against some set of

criteria that would hopefully lead you in some reasonably objective manner to determine that one particular idea would actually achieve your goals, or one would fall short.

All of that work remains to be done.

And then, you know, exactly how you would measure and assess that. That would take a lot more conversation.

So, that work is still out there, and it's I think important work at some point to come back and return to.

But Jennifer, if you could switch to the next slide?

So again, NTIA should consider whether CSMAC should continue this work, and in what aspect.

We have talked internally, and given that the current term ends in about eight months, to the extent NTIA would like this working group to continue, we think that the scope of work should be narrowed for that eight months so we can achieve something a little more concrete than just an exercise in option ideas.

And for example, one suggestion we have for NTIA is they could direct us to focus on non-statutory reform options and do a deeper dive into those.

That would be something achievable, and a second report could sort of focus on those for the eight months that we have left in the cycle.

And with that, I conclude the report, but I do want to thank all the working group members who participated.

We had great attendance on our calls.

I really want to thank Carolyn Kahn for her contributions to the report, but all of you had great input into these ideas, challenging us, pointing out issues, pointing out rationale.

It was a great conversation. I think Jennifer and I enjoyed it immensely.

We learned a lot from you, and we want to thank you for your efforts.

CO-CHAIR WARREN: Mary, this is Jennifer.

Jennifer, did you have something more

you wanted to say? Sorry, I thought --

MR. REED: You're on mute.

CO-CHAIR WARREN: Yeah, we can't hear you, Jennifer.

MEMBER MANNER: Oh, I'm sorry, I have nothing to add.

CO-CHAIR WARREN: Okay.

I wanted to thank you both because this has been an incredibly -- and I think the term Mary used -- robust dialogue, very active group.

There was no loss or lack of voluntarism.

And the brainstorming and the whiteboarding.

So, you know, kudos for creating that kind of working group environment to both of you because leadership counts there, obviously.

So, and I think something that you both said that's really important is the value of the range of the options kind of just being on paper, and while not any one of them perhaps -- any of them perfect, they're all generated by perceived

gaps or needs, and are I think a good legacy, if you like, of the work of this group, again, generated by that robust discussion.

With that, and my thanks, I want to turn it over to the floor, I should say, and see if there are questions, comments for discussion, because obviously now that we have the final report in front of us, it is to us to vote on it and hopefully adopt it.

So, let me open it up though to CSMAC members, and see if anybody would like to offer comments or topics for discussion within this framework.

CO-CHAIR RATH: Yeah, and this is Charla.

Just a reminder, if you want to speak, the equivalent of putting up your tent is actually just putting your name in chat for Jennifer to see.

CO-CHAIR WARREN: Thanks, Charla. I appreciate that.

If not, this could be the first report adopted by acclimation.

(Simultaneous speaking.)

CO-CHAIR RATH: Wait, I think Dennis is interested in speaking, Jennifer.

CO-CHAIR WARREN: I see it. No, don't worry. Dennis, and then Dale. So, Dennis, over to you, please.

MEMBER ROBERSON: I just have a small question since we have reviewed most of the material in the past.

But on the research and development proposal, there seems to be one obvious iteration that isn't there, and that would be to have an R&D function that would be jointly owned by NTIA and the FCC, and put into the FCC labs and ITS, and perhaps other functions, and have it co-managed so that the source data upon which decisions are made would be in common.

So, it's in line with the rest of what the proposal describes, but that particular version doesn't seem to be there.

Is there a reason why that was not put on the docket?

MEMBER MANNER: Mary?

MEMBER BROWN: Actually, in the write-up on the report, we do refer to the case where if institutional reform does not happen such that spectrum governance is put in one place, that the R&D function could be achieved by coordination between the FCC and NTIA as part of the MOU process.

They could define that coordination as part of the MOU process because it's exactly your point.

There is a lot of work, whether it's looking at propagation models, or demand studies, or band adjacency issues, or sharing issues, trying to get at how we use spectrum more efficiently that really runs across these two agencies.

So, it is there.

It may not have been called out as -- you know, maybe we could put a little headline around it or something in the report, but I share your thought, and I assure you in the written report, there is that reference.

CO-CHAIR WARREN: Okay. Thank you.

Let me turn to Dale, and then after Dale, I'll turn to Michael.

(No audible response.)

CO-CHAIR WARREN: Dale, the floor is yours.

(No audible response.)

CO-CHAIR WARREN: Dale, you may still be on mute.

MEMBER HATFIELD: Yeah, I think I am.

CO-CHAIR WARREN: There we go. Now we hear you.

MEMBER HATFIELD: Can you hear me now?

CO-CHAIR WARREN: Yes, please.

MEMBER HATFIELD: Okay. Thank you. I apologize for the fumbling there.

First of all, it's been a real pleasure serving this subcommittee. I've learned a lot.

As you all know, I've been in business here for something like seven decades now, and I would offer an (telephonic interference) that I think a lot can be learned from the history here that's not been totally uncovered.

So, I think we might want to continue going forward looking at that history.

The second thing, and I said this before, that incentives really, really matter, and if you don't change the incentives, I don't think you get very far.

So, there's still going to be an awful lot of tension between commercial operations and national Homeland Security public safety, past agencies of -- or communications, and so forth.

So, we need to continue to focus on the incentives issues, but more fundamentally -- and this has occurred to me as Mary as you spoke -- rather than narrow the scope of what's being done, perhaps it should be expanded greatly, where at a stage with prospects for a new administration, whether it be upon one side or the other.

And if you look at history, for example, going back, there was the Rostow (phonetic) Committee Report, and really expanded greatly beyond the membership of what we have here, and I'm not in any way -- I think we've had a limited

group of experts, but I'm wondering if perhaps this isn't so important to the function as a whole that we invoke something like a major study that brings in very, very senior people from all different categories and groups, and think about this problem.

Like I say, just to summarize, you've really convinced me during sort of rehearing our presentation here, rehearing it, that this is so darn important.

Maybe we better reach even further upward to try to get more effective analysis going forward. Thank you.

CO-CHAIR WARREN: Thank you, Dale. Now, we have Michael.

(Simultaneous speaking.)

MEMBER BROWN: So --

CO-CHAIR WARREN: Sorry. Mary, I was going to get Michael next.

MEMBER BROWN: Oh, I just was going to respond to Dale briefly.

(Simultaneous speaking.)

MEMBER CALABRESE: Oh, go ahead.

CO-CHAIR WARREN: Okay, I was going to have you maybe guys respond to the collective.

MEMBER BROWN: Okay, sure.

CO-CHAIR WARREN: You guys don't mind?

MEMBER BROWN: Yeah.

CO-CHAIR WARREN: Michael, go ahead.

MEMBER CALABRESE: Oh, sure. Thanks.

And yeah, Dale said, and the co-chairs of the subcommittee said this was a very useful exercise.

You know, I thought, and we put important ideas on the table.

One thing I just wanted to endorse briefly is the notion at the end, I believe the last slide, that although we probably can't contribute a whole lot more with respect to major changes that require a legislation, I think we could go quite a bit deeper and contribute quite a bit more in regard to non-statutory reform options.

You know, the actual nature and scope of the MOU reform, for example, or how to handle

an escalation of lack of consensus, let's call it, between FCC and NTIA.

Those are topics for example that, you know, we could make progress on without legislation, and, you know, I hope we will extend the work of the group and focus on those non-statutory reforms.

CO-CHAIR WARREN: Thank you, Michael. Let me give it to our two co-chairs, Mary, and then Jennifer.

MEMBER BROWN: Yeah, I just wanted to comment on Dale's statements about the census matter. And I couldn't agree more.

As I said, we never got to the part of the conversation where we sort of evaluated whether specific ideas would actually yield a better result or outcome relative to today's structure.

And incentives would be one of those criteria. I completely agree.

I think the ability of a new structure to drive better consensus among all the stakeholders would be an important thing.

There are probably many, many criteria which our working group could come up with that you would use to evaluate whether a particular reform idea was going to leave you in a better spot than today, right?

We never got to that part of the conversation.

As I said here, I do think that's a useful conversation to have.

Even in the absence of a National Spectrum Strategy, it's a useful conversation to have.

But the recommendation to sort of narrow it down on the non-statutory reform issues, which Michael, I think, just endorsed, is really more of a reflection of the time left on the calendar.

But I do hope Charles and others will take note, Dale, of your enthusiasm here, because I share it. Thanks.

CO-CHAIR WARREN: Thanks, Mary. Jennifer?

MEMBER MANNER: Thanks, Jen. So, I agree with Mary, of course.

And Dale, I just wanted to come back on the history because I do think that was one area, both the history and the international lesson -- so it's a little hard because the U.S. is split between government and non-government -- (telephonic interference) -- because we have such a long history of having split on spectrum management.

But I do think that's an area should Charles and company, you know, ultimately want more work done on this, I think that is something we need to look at more closely at the different options, as well as the international, and, you know, as well as Mary said the incentives, and I completely agree.

You know, the MOU is long overdue in particular, so I do endorse his view that we should look at the other options and the view of the working group, on things that, you know, are more short-term in nature and don't require legislative changes.

And I just wanted to add my additional thanks to the working group because it was really a pleasure for Mary and I to work with all of you.

So thank you, Jen.

CO-CHAIR WARREN: Okay, thanks.

Jennifer and Mary, just a question I would have.

If NTIA asked us to continue looking at non-legislative recommendations, and refining some of our thoughts, would not a study or a panel -- or a version of what Dale suggested, that could be part of what we looked at if we were asked to, because they don't always have to be legislatively commissioned.

So that wouldn't necessarily be off the discussion if we were asked to look at further work in that direction.

Am I right?

MEMBER BROWN: Yes. As you often say, Jennifer, we do whatever the NTIA asks. So.

CO-CHAIR WARREN: I prefaced with, if asked.

So, let me ask if we are ready to approve the report as it's been widely circulated and available to everybody for a while, and I think we've had a number of opportunities and very fulsome discussions in the working group to kind of be very familiar with it, all of us.

So, I think unless I see any other requests for comment, I'm going to put it to the group for vote to approve and adopt.

Could I have all the ayes? You'll have to come off mute.

(Chorus of aye.)

CO-CHAIR WARREN: Thank you.

CO-CHAIR RATH: Maybe we should ask for nays.

CO-CHAIR WARREN: I was going to. Are there any nays?

(No audible response.)

CO-CHAIR WARREN: And you have to come off mute too if you want to give us a nay.

(No audible response.)

CO-CHAIR WARREN: Okay. So, we have

adopted our first report.

Thank you very much again, Mary and Jennifer, and everybody who participated in that group.

And with that, I'm going to turn it over to Charla.

CO-CHAIR RATH: Great, thanks. Thanks, Jennifer.

And just very quickly, the next report is Working Group 2, or Subcommittee 2. I'm never sure what we call them.

But, and that's Mark Gibson and Bob Weller, non-federal current and future spectrum requirements.

And Mark, who's already captured the screen, is going to report for us. Go ahead, Mark.

MEMBER GIBSON: Okay, thanks Charla. Bob had to go to another subcommittee on C Block, which is probably going to last the rest of this meeting, so I'm going to do this solo.

And I just wanted to add my voice to those, the accolades on the subcommittee or Working

Group 1, that's an incredible report and an incredible amount of work, and, you know, from the subcommittee hearing that I was at last week on the Senate Energy and Commerce Committee, I think they'll be very interested in those results as well.

So, thank you for all the work you guys did.

Of course, I was part of that too, and I think I joined maybe two calls. But thank you. That's great work.

So this is Subcommittee 2. This is our final report for what we did.

Here's the committee members. I want to thank everybody's involvement. It was a team effort, so thank you all for your work.

Here was our question, and a lot of what I'm presenting right now is information that I've already put out there, but it's more or less context to the recommendations than what we have at the end.

So, basically the question here was to, you know, look into the feasibility utility of

getting information on current and future spectrum requirements from industry or other non-federal government spectrum users, and then considering that information, or whether that's available, identify what information might be already available across the board, and then recommend approaches on how future spectrum requirements could be determined from that information and from current spectrum usage of non-federal users.

So basically, take a look at the non-federal users and find out how NTIA can get more information on current and future uses.

So that's the question. We parsed the question down into three tasks.

The first task was just to explore the feasibility and utility of requesting this data for future and current.

We broke it actually in current and future, figuring that if we couldn't get current, we may not even be able to get future from non-federal users.

So that was the first task.

The second task then was considering that, you know, the result of the first task, then identify what information is already available.

And even looking at prior CSMAC reports and recommendations, and we presented most of that in an attachment.

And then finally, recommend approaches on how NTIA can obtain future spectrum requirements and use for non-federal users.

We had a couple of discussions within the subcommittee working on that, and we went back to the NTIA, and I want to thank Bruce and Shane (phonetic) for helping clarify some of the work we were doing.

They're our subcommittee liaisons. So, we kind of got a deeper dive, and kind of wanted to understand a little bit more about what was the NTIA going to do with this?

Because that helped us better understand, you know, the type of information that we would be looking for.

And so, we had a couple meetings, and

the upshot of those were, and what you see here -- and so basically, the first thing is to just basically see what information is available that's out there to basically facilitate sharing between federal and non-federal users.

And this builds on themes that we've been working on in CSMAC since I've been a member.

The other thing is to anticipate the spectrum needs that non-government users are going to have, especially as it relates to possibly sharing federal spectrum, like for example, the 3.1 gigahertz band.

The other thing is that the NTIA wanted us to use in companion with the work they're already doing for federal agencies, and to see how they can take advantage of what the commercial industry might have, that can be instantiated in the federal sector.

The other thing is the NTIA wanted to try to make a comparison, you know, between these two uses, between federal and industry use, primarily to spot trends, just to see how spectrum

is being used, how technology impinges on spectrum needs, and some of those things.

And also, a description of what needs to be done to collect this data. You know, if the data's not sitting out there in one omnibus database, you know, what does NTIA have to do to get to that data, and is it more than just looking at data?

Are there sort of data mining and AI deep learning things that could be used?

And then finally, what are the categories of data that are out there? You know, including geographic, temporal, frequency, whatever.

And then, finally, what elements are needed to support greater sharing?

So that was essentially the additional direction that NTIA had, which was very useful.

It helped us get a little more context for what we were looking for.

So, these were the questions that we developed within the subcommittee to really begin

to answer the question.

So the first question was, what data are needed?

And for anybody that thinks data is singular, Bob and I agreed that data is plural, so if that gives you agita, just get right with it.

How are the data used? You know, so what data are needed for what NTIA is doing and how will that data be used?

And then what are the limitations to that data in terms of costs, form?

You know, if there's a really beautiful database out there but it's going to cost several, you know, millions of dollars, let's say, you know, is that necessarily something NTIA wants to think about?

So we want to consider cost.

We also want to consider the technology implications and advances on spectrum use.

So that's really, you know, for example, you know, just transitioning to 5G, or

transitioning to much more spectrally efficient types of technologies across the board.

Not necessarily for communications, but for things like radio location, and other things.

So there's certainly a technological implication of this.

And probably one of the bigger questions that we ran into was whether or not NTIA has authority to gather or collect some of the commercial data, and you'll see that in some of our finding in a moment.

And that led to the next consideration, is, you know, data on some commercial operations could be difficult to obtain.

It could be sensitive, it could be proprietary, it could be information that the owners of that data, especially if it's data on their own operations, might want to make available.

So, how can NTIA go about getting that data? Can they get that under NDA?

Are there approaches that NTIA can take

that protects that data from things like FOIA and whatnot?

So those are questions that, you know, we also asked.

And then considering the diversity of the data sources, and then complexity of the acquisition and analysis, we thought that NTIA, maybe some of this data acquisition and data analysis is not in NTIA's wheelhouse, at least now.

It might be if we think about what Subcommittee 1 recommended with respect to their research agency, which is a fascinating approach.

But for now, at least, you know, does NTIA want to hire data scientists to go after finding this, or is this something that NTIA might want to contract out or outsource?

And so, those are some of the considerations there.

And then finally, the recommendation on the research R&D element that Jennifer and Mary just talked about, and how that might be able to play into this.

And also even considering the capabilities that ITS and this brings to this, as well. We didn't dig that deep into it.

So those were additional questions that we had to kind of get us going.

Our work plan was more or less this. I think we met for ten times, so not quite as much as Subcommittee or Working Group 1.

So, the first thing was to identify the commercial services to study.

We felt like parsing this into the FCC's definition of commercial services would give us a template on how we could look at services and determine the extent of which spectrum use is increasing, steady, or decreasing, or might be in the future.

So, we felt like we probably should look at some of the traditional services for which spectrum use is flat or declining.

So, and so we basically try to parse this into things that were a little more tractable.

And then we looked at that, at those

services, and characterized that in terms of again, whether the spectrum use by service is growing, whether it's stable or declining.

And what I have as an appendix, that's also an appendix to the report, is more or less an example of what that looked like.

It might be hard to see in the report, but I'll put it on the screen here in a little bit.

We also want to identify whether the data are available.

And, you know, nobody on this committee are data experts, except for some of us perhaps that know the data that we have commercially within our areas of influence or areas of responsibility.

But we thought we'd try at least to identify whether data is available that we're aware of, or whether data is not available that might need to be determined about.

And then we also looked at possible data sources considering both the current and future use.

So, if we know that data's available,

especially, again, disparate data that can be used in, again, sort of data engineering or data science type means, to identify trends and usage signatures, if you will, that might not be readily evident by just looking at one data set.

And then finally, we created a set of recommendations.

So from our findings, the one thing that we encountered was there was concern about, you know, NTIA's authority to collect information from commercial licensees.

While the committee certainly generally agreed that, you know, it's data probably that would be of use to this effort, there are concerns, as I said earlier, about the proprietary nature of the data and the need to protect it from disclosure.

And, you know, we thought, well, maybe NDAs would work. Nobody on this committee is an expert in that.

So, it could be that, you know, as future work, perhaps there may be need study around

how you can bring data in and give it the appropriate protections that are needed.

And so, we felt like, you know, before you dig too deep into this, to the extent you want data from commercial spectrum users across the board, whether it be CMRS licensees, or land mobile licensees, or whatever, the whole idea around how to square that issue probably needs to be addressed sooner than later because it would be a fairly glaring hole lacking that information that you'd have to try to fill in with other sources.

We also found the data for some of these services available publicly, but we weren't sure about the quality of that data, and so, the data should be verified.

And so, for example, one of the data sources out there might be the Antenna Structure Registration database that's connected to the FCC.

There's a certain amount of that data that's in that database that's absolutely accurate because that data is used for the FAA to pull together the obstruction database.

But there's other aspects of that data which may not be terribly accurate, so an effort needs to be undertaken to look at the accuracy of that information.

The other thing is the data formats, obviously, because they're going to be from disparate sources, are going to probably be all over the place, and not consistent at all.

So, the NTIA is probably going to have to undertake a fair amount of post-processing on that data to make it useful.

And again, you know, a lot of the people we've worked with over the years are magicians, but there's only a few of them, and so there would be a resource issue we think probably as you would deal with that.

And then finally, the utility of the data will be highly suspect if you don't do this post-processing.

And again, one of the things we were thinking about is, you know, again, data science and data mining, pulling data from disparate

sources to identify things that might be hidden.

So that was basically how the committee did our work, and here are the recommendations.

So, one of the first things we said is look at this. There were sources of spectrum usage data that were provided in our appendix of the report.

I don't have it here, but what we were able to do is to identify a lot of sources of spectrum usage, spectrum demand data, things that are published by trade associations, like for example, CTIA, 5G Americas.

And then there's also companies that also publish information on spectrum usage. Cisco used to, I don't think they do that anymore. Ericsson does, and others. So, you know, we have several of them listed.

The other thing is to survey existing federal sources, and we did not presume that NTIA was not aware of that. But we thought it might be a worthwhile endeavor to survey across the federal databases to find information on spectrum

resources.

So for example, there may be information, you know, in environmental databases on tower and pole locations that could be cross-referenced with FCC information.

So, we're talking about looking across the entire federal landscape, so to speak, to find sources. Maybe not necessarily on spectrum usage per se, but that can be aggregated in with other data sources.

And they also said don't limit it obviously to federal, look at commercial data sources. There's a wealth of commercial data out there. We have a database. There's a database the EWA has. There's databases from companies like Mosaic, which aggregate information from carriers to develop coverage area maps.

There are lots of data sources out there from commercial sources, but there would be cost associated with some of that. And again, you won't necessarily know the efforts that went in to collect and aggregate that data, so you'll have

to undertake efforts to determine the worth of that data.

And then we started getting into thoughts about working with research and development agencies to identify and quantify technology trends. These are things that, again, a lot of the folks in NTIA already follow this. You guys are members of standards developing organizations.

This is more like working with people that are, I don't want to say futurists, but are identifying technology trends and can help maybe chart paths forward that NTIA might be thinking about in terms of how this data could be used a lot more effectively and efficiently, in terms of spectrum demand and, you know, what to watch out for.

As I said several times, look at the data and existing sources considering advanced data mining techniques. We have learned by virtue of the databases that we manage that taking a look at the data sets with fresh ideas around data mining

and data science unlocks immense amounts of information.

And you can also bring in commercial data sources again, like Google Earth, for instance, and you can start mapping things. We've done a lot of that, for example, to identify locations of telecom facilities.

And then finally, you know, there (telephonic interference) almost by virtue of just the way that has been thought about would be an amazing resource to take advantage of, to the extent it comes to fruition that could take this on.

You know, Mary and Jennifer and I talked a little bit about this within the context of our working group, and they brought a lot of great ideas about how to do that, and other members of that subcommittee, as well.

So, that whole notion of the looking at the research and development function within Subcommittee 1, especially with the framework that they're talking about, could provide a lot of interesting insight.

So those are the recommendations. The only thing I want to show now is the worksheet that we did just so you can see it. It's an appendix that's a separate document with the report.

But you can see on the left it's all of the services that we identified, more or less as it relates to the part numbers that they correspond to in the FCC CFR.

But, you know, there's a column there just to the right where we identified whether the spectrum usage was increasing, flat, or declining.

In some cases, we weren't exactly sure. For example, if you look under Part 27, 1.4 gigahertz band, that may be just flat, but we weren't exactly sure.

Then we identified data sources where that information is contained primarily within the FCC's databases. I think actually exclusively in the FCC's databases.

So this is really more just to give a sense of sort of our thought processes and how we came about it, and here's the bottom part of that.

So with that, that is all I had for the presentation. I'm happy to take questions.

CO-CHAIR RATH: Great. Thanks, Mark. If anyone has any questions for Mark, put your name up in the chat, and we'll see.

I don't see anything yet, but it could take a couple of seconds. So, let's just -- no, I don't see any questions, so --

(Simultaneous speaking.)

MR. REED: Dale has one. Dale has a question.

CO-CHAIR RATH: Oh, Dale. Sorry, it just popped up. Thanks. Dale?

MEMBER HATFIELD: Yeah. This is very quick. The other thing is interference collection information.

On the TAC, we've been talking about that a lot, so, and thinking about collecting information on usage, of course, another kind of usage is interference. And so, there might be some benefit in sort of thinking about both a little bit while you're doing this.

MEMBER GIBSON: So, that's a great comment, Dale, and in fact, it kind of leads me to a comment I want to make. I've said this a couple times before within CSMAC.

You know, it'd be great, and I think I've heard you say this too, Dale, that somebody develop an interference reporting database.

As I've said before, there is an equivalent type of database that NASA manages for aviation. And I can never remember the acronym for it, but it's basically an aviation resources reporting database that anybody involved with aviation -- it could be a flight attendant, it could be a pilot, it could be a ramp worker -- that identifies a potential issue, can put that information in that database.

And one of the things they get is amnesty from certain federal aviation regulations that might be breached, assuming no one's put at risk or harmed. But it's a fascinating source of information that the FAA and NTSB have used to help improve the safety of aviation.

So, I think putting together some sort of a database on interference reporting would really help inform the entire aspect of spectrum usage, so that's a great point, Dale, thanks.

CO-CHAIR RATH: Any other comments or questions before we move to a vote?

(No audible response.)

CO-CHAIR RATH: Oh, it looks like we're good, so I put it out then for a vote.

Everyone in favor of adopting the report from the non-federal's current and future spectrum requirements, the subcommittee please say aye.

(Chorus of aye.)

CO-CHAIR RATH: Any nays?

(No audible response.)

CO-CHAIR RATH: Great. That's good. Thanks, Mark, and thanks to Bob in absentia.

MEMBER GIBSON: All right, thanks everybody. Yep.

CO-CHAIR RATH: Now we're moving on to the third report, which is the IPDR, the unique

transmitter identifier.

And I think Bryan Tramont's going to actually talk while Mariam controls the deck, so -- if I've got that right?

MEMBER TRAMONT: You're absolutely correct, and Mariam is on it, it appears. So, multitasking.

CO-CHAIR RATH: She looks like she's in a sound booth.

MEMBER TRAMONT: We're not actually -- there's a longer story about that.

Neither one of us is great at multitasking, so we're going to go one at a time. I will do the talking, and Mariam will do the PowerPoint.

So, we're with Subcommittee 3, interference prevention, detection, and resolution. You have the subcommittee list. I believe this is our third or fourth time presenting to you on this.

I guess at a micro level, I should say that we had previously circulated a PowerPoint,

which is largely consistent with the prior PowerPoint that we circulated in terms of bottom line recommendations.

We also fine-tuned what is now a 17 page report that we sent around in advance of this meeting, as well. Most of that remained consistent over the last two generations of it.

What changed, however, is we did a number of interviews with subject matter experts that we think enhanced and fine-tuned some of the data and the recommendations.

So you'll see some of that, or I hope you already saw some of that in the draft report.

So today, I'm going to just review the PowerPoint, but as I said, that 17 page report was also circulated, so and we hope to get that voted on last.

So the question presented how could NTIA's and the FCC's equipment authorization rules be modified to require that all transmitters use unique identifiers? What are the barriers to doing so?

In terms of the process we went through, we started and since our last meeting, you see that we had drafted the report and circulated it at the April meeting, and then we had calls with Milo Medin from Google, Rhett Butler at Comsearch, and Paul Denisowski at Rohde & Schwarz, as well as the information that Pericle, Jay Jacobsmeyer had given us during his interviews, so all that got folded into the report that you have before you today, and that's the major shift from the last draft that you all saw.

In terms of recommendations, the first question really asks how you do this, and administratively, what's the process?

And the answer is it's pretty straightforward. The rules and process for modifying equipment authorization rules to require these transmitters have one unique identifier, it's fairly linear, so we didn't spend a lot of time on that, candidly.

What we did spend more time on is identifying the subcategory of bands and use cases

where unique identifiers would be an effective and viable regulatory tool.

There are many challenges associated with implementing such a regime, certainly on a broad basis, and so we recommended this case-by-case and band-by-band approach, rather than something that's more prophylactic, or one size fits all.

So, to the next one. Okay, thank you.

One of the things we did is we looked back through the administrative record and a number of proceedings where unique identifiers were considered. In some cases, they were accepted, in some cases, they were rejected.

And we tried to tease out, I guess a matrix, of considerations that went into the FCC deciding one way or the other, and then the committee validated or rejected those general matric dating criteria for the use of unique identifiers.

So, places where they ended up being useful, where share channels were involved, or they

were critical government users.

In contrast, where they were not so often used is where they could be readily identified by service area. So, if you have a licensed service and it's licensed to AT&T, and Verizon's adjacent to them and they're getting interference from the adjacent channel, they can pretty safely go to AT&T.

So, those cases the commission is not as likely to use them, or has not been as likely to use them. And there are other use cases where they also have rejected them, a lot derived on how efficacious the identifier would actually be, or how likely it is something with a unique identifier would be the cause of the interference.

In cases where it was unclear what the industry's technological evolution would be like, there's been some reluctance to impose a unique identifier requirement because of the added costs associated with it, and the commission has been reluctant to prejudge a business model into a particular band.

What else? Okay, and then, yeah, when

anytime it could retard the development of technology or ecosystem, and if it's likely a service that is not going to experience interference, then they are not as likely to impose a unique identifier requirement.

So, once again, we sort of just went through the various cases where the FCC has considered this -- and this is in the report -- and tried to key that with those overall themes were.

The takeaways on the next slide. So, it's complicated and costly to retrofit anything, and if there are issues around transmodulation and decoding of identifiers in particular.

And so, there is a general reluctance to impost unique identifiers in a band where they already are experiencing interference issues, right? So trying to go back and retro-engineer the interference and mitigation regime was not seen as something that was very viable.

Folks pointed to the CBRS framework, and we've talked about this some already. As an

example of a regulatory generation model that largely addresses many of these interference concerns, it was noted that that's not yet been approved in the marketplace, but nonetheless, its paradigm is there in CBRS context.

One of the interesting things about our conversations with the expert was that experts, many of them were interference hunters, so they were hired by private parties, right, to go out and find the source of the interference.

They found that in most cases, the interference was not coming from something that was an intentional transmitter, even. Intentional radiator, rather. Most were from unintentional radiators, such as air conditioning units and street lights, et cetera. And so, the unique identifier would not be terribly helpful.

So, that's an added wrinkle. It underscores the importance of something like the database that Mark and Dale were just referring to.

And of course, there are some

competitive and security issues that could arise from authorization to decode identifiers, if not managed carefully, and we don't have control over the database.

As with all sensitive information or identifying information, access to it would need to be carefully controlled.

All right, I'm going to put the next one, Mariam, if we can? Ready? Okay.

So the three gating questions that we came to assist policy makers in deciding: what are good candidates for this, how often will the harmful interference occur, how consequential will the harmful interference be, and how difficult is it to identify and remedy the cause? So, that part actually is fairly linear.

The more often the interference occurs, the harder it is to remediate with other tools, the stronger the case is for exploring whether requiring devices to transmit unique identifiers is the right policy tool.

And the things that we identified from

the beginning and did not, you know, I think we walked away with understanding as a group that unique identifiers can play a role, but there are certainly some challenges. Standards, development, and technological change, device capabilities themselves, privacy and security, and the impact on innovation and investment all came up.

So, that is the overview, and I feel badly because I think I fell into the trap that Mark Crosby always makes fun of me for because I talk too fast.

But nonetheless, we are ready for adoption of the report, but we're also open to any questions. Mariam will take all of the difficult questions. I am open for the others.

CO-CHAIR RATH: Looks like Jennifer.

(Simultaneous speaking.)

CO-CHAIR WARREN: I wanted to do it this way instead of just as co-chair.

Yeah, so my first question is, I thought it was interesting in the presentation where one

of the FCC takeaways was that it wouldn't be imposed when it was found that it would restrict technological development, something along those lines.

What was an example, if anyone -- you, Mariam, recall, or anyone from the committee? What was an example where it was found to retard or restrict technological or technology development?

MEMBER TRAMONT: Yeah, so let me give a spin, and then someone more informed can jump in.

My recollection of where that came from was that when the commission had decided it wasn't going to do it, it cited the need for technological innovation and change in the band over time for the reason not to do it, that they were worried that they were going to lock in certain business models.

To the best of my knowledge, it was never a situation where they adopted it, and then said in retrospect that was a problem.

So I think it was a prospective, and

one, of sort of a series rationale for not doing something unique identifiers in a given band.

CO-CHAIR WARREN: So not a specific technology that they said would be inhibited. It was just a justification then of a particular situation?

MEMBER TRAMONT: Yes, yes.

CO-CHAIR WARREN: Okay, thank you.

MEMBER TRAMONT: Mariam, did you have more than that?

MEMBER SOROND: No, I think you're right. I agree with you.

CO-CHAIR WARREN: Okay. Thank you.

MEMBER TRAMONT: Well, and let me --

CO-CHAIR WARREN: I think --

MEMBER TRAMONT: -- say one more thing because I did now just jump into the other section because I thought I remembered where this was.

And in the report, you'll see on page 7 that one of the things they pointed to was that technologies being developed for use and expansion make it easier for operations to coexist, and making

the likelihood of interference less, which therefore made them more comfortable not imposing the thing.

So that's another kind of take on the way the technology would make it less necessary or desirable.

CO-CHAIR WARREN: Thanks. I will read that more closely. Thank you.

MEMBER TRAMONT: I would hope you would, Jennifer. Geesh.

(Laughter.)

MEMBER GIBSON: Hey Jennifer, it's Mark Gibson.

CO-CHAIR WARREN: I think --

MEMBER GIBSON: I have a quick question.

CO-CHAIR WARREN: Yeah, Mark has a question. Yes?

MEMBER GIBSON: Yeah. So hey, Bryan, or attorney meeting, I'm sorry. Great report.

You know, if this is in the report, forgive me for asking something that might be

obvious, but how do you propose to go back and apply this to systems that have already been deployed?

Is this a moving forward, or is this a whole encompassing approach?

MEMBER TRAMONT: No, absolutely. You're absolutely right.

One of the biggest and most consistent concerns expressed by all four experts, including this very knowledgeable fellow from Comsearch, said that that was a big problem, that it was much more likely that this went through a proper policy tool in a band that is just being launched as opposed to trying to do anything to retrofit.

So absolutely, yeah, completely.

MEMBER GIBSON: Okay, great.

MEMBER TRAMONT: That is addressed in the report.

MEMBER GIBSON: Okay, great. And by the way, Mariam, I love your studio. All right, thanks.

CO-CHAIR RATH: Yeah. I am not seeing

any other questions.

Bryan, Mariam, do you have anything to add before we go to a vote?

MEMBER TRAMONT: Mariam is just going to do a quick jazz session from her studio, and then we're going to go from there.

(Laughter.)

MEMBER SOROND: Sorry, I keep getting muted.

This is a podcast studio that my husband uses for soccer, so just --

CO-CHAIR RATH: Oh, wow.

MEMBER TRAMONT: For soccer?

MEMBER SOROND: And it's the only room in the house that I get to yell and no one hears me.

MEMBER TRAMONT: Like a panic room.

CO-CHAIR RATH: Yeah, exactly.

MEMBER TRAMONT: And notice she chose that for the CSMAC meeting. I don't know what she was suggesting would happen during the discussion.

(Laughter.)

CO-CHAIR RATH: So, onto a vote, then. So, everyone in favor of adopting the IPDR report, please say aye.

(Chorus of aye.)

CO-CHAIR RATH: Any nays?

(No audible response.)

CO-CHAIR RATH: Great. Thank you both. That was great. And back to you, Jennifer, for UAS.

CO-CHAIR WARREN: Thanks, Charla.

So now we, after having completed adoption of three reports and the deliverables there, we're moving to the one open group scheduled to be opened at this point that's looking at UAS, and going to provide us with an update of where they are.

And I'm going to turn it over to Carolyn, who is going to kick us off. Carolyn?

MEMBER KAHN: Great, thank you.

So like Jennifer said, so unlike the other subcommittees, we had a staggered start that was planned to help balance the workload.

So I think our subcommittee is about one meeting behind as planned, and so we'll be reporting on our progress today with a draft report being prepared for the next full CSMAC meeting.

So, I would like to thank all of our subcommittee members for their contributions to this work. We've got a diverse subcommittee, from terrestrial wireless, dotcom on license, dynamic spectrum access. So I really appreciate the different perspectives, as well as the support from the NTIA liaisons.

Sorry, and I'm forgetting to change the slides here.

So, our question is focused on, so, Unmanned Aircraft Spectrum. The FAA has the responsibility for ensuring the safe integration of all classes of UAS into the National Airspace, including small and large UAS.

Spectrum to support C2 operations is critical for these emerging applications, including urban air mobility and transcontinental cargo delivery.

So, our questions are what are appropriate models to ensure timely and secure access to the frequencies needed for UAS C2 requirements, as well as what government characteristics are important?

Are there liability issues to consider? Is it a third party frequency coordinator model? And is there a potential need to create an entity that supports and facilitates collaboration across the different federal advisory committees for UAS? And developing an alternative mechanism in government structures for such an entity.

We've had many subcommittee meetings. We kicked off in January, and have had frequent meetings since then to scope and plan our work, gathering information, developing a framework, providing and discussing status updates.

Our more recent meetings have focused on potential spectrum access mechanisms, and we have conducted some interviews.

We interviewed the FCC Technical Advisory Council, and we really appreciate the

input that they provided and the opportunity to learn more about the work that the TAC did and perspective on spectrum for UAS CNPC.

We also had an introductory interview with RTCA and received some written responses to our questions, as well as we have an opportunity to follow up with them, and we're working to schedule additional interviews as well.

The approach that we are taking is a two-prong approach to examine the current state of the UAS environment and the committees supporting it.

We are developing a spreadsheet matrix of the different organizations, the different activities involved, interviewing advisory boards and other organizations to collect additional information on this.

And the goal here is so that we can provide value. There's a lot of activity going on, and don't want to duplicate, want to add on and create value.

And then also, we're working to

identify options for spectrum access mechanisms for UAS, including possible solutions to meet some or all of the UAS requirements, and evaluating them in terms of pros, cons, and different priorities.

Many of these spectrum access mechanisms could apply to many bands, including C-band, 5030 to 5091 megahertz.

C-band is a focus of current work because it has the appropriate allocation and is available for use, but access mechanisms need to be defined further. And the approach might vary depending on UAS classifications. It might require multiple and overlapping approaches, as well.

So here, this shows a highlight of UAS activities going on, different federal advisory committees, as well as other organizations working to advance UAS CNPC.

It's great that there is so much activity, and this is not a complete set, but does highlight some of the key activities going on, and includes, like I mentioned, federal advisory

committees, also some standard organizations, a pilot program, and then activity for Congress.

There are a lot of different activities to track with different points of contact, different timelines, and knowing this information and information sharing is particularly important for informing UAS CNPC requirements, and ensuring coordination, integration, and focus across all of these different activities and progress.

And we'd like to again thank subcommittee members for their input with all of this work, including this spreadsheet here.

So, you know, some of the organizations here, the FCC TAC, the FAA Reauthorization Bill, Section 374, the FAA Drone Advisory Committee, the DAC, ICAO, the International Civil Aviation Organization, NASA's UAS Traffic Management Pilot Program, UPP, Traffic Management Pilot Program, UPP, RTCA, and 3GPP.

I wasn't planning to go into detail discussing all of those, but you can if you like. We do have some information here, and some

additional information that will be going into our report.

Andy, I can turn it over to you to talk more about the potential spectrum access mechanism.

MEMBER ROY: Great. Thanks, Carolyn.

So what we wanted to do was, there's still a lot of active discussion on the spectrum access mechanisms that we're currently discussing in the subcommittee, so this is really intended for the committee to be a snapshot of what we're talking about, noting that caveat as we go forward.

And to reiterate what Carolyn said before, certainly the views at the moment is the spectrum access mechanism being discussed, and potentially others as well, could apply to many different bands, including C-band.

Obviously C-band there is available. It has a terrestrial and satellite allocation to it, so it is ideal to look at, and certainly in the short-term.

One of the other common themes as well that we've talked about is that the UAS

classification of whether they're large, small, or different mission types can certainly be dramatically different.

It's certainly a very cutting edge part of technology as they develop, and therefore, they will have different and multiple overlapping approaches for spectrum access that could be used for each mission type or each requirement.

And some of you even said a UAS may even have multiple different bands or different systems on board, and chooses as it flies around what may be necessary to access as in the different airspaces and different mission types.

So, to go through then -- so the next slide, please, Carolyn.

So, one of the models that's being considered is what we call a third party coordinator, very much more traditional.

The way aviation currently does some of its VHF licensing, for example, with a dedicated individual licensed assignment for each ground station, user, and network on a demand basis.

Mainly human-in-the-loop, with some automated methods to try and speed that up, as required. But given that the aim is to try and pre-coordinate many of the issues that would come up -- so, COSA issues, propagation, and so forth -- to really minimize the processing overhead going forward.

But obviously it is not an instantaneous turnaround, especially getting licenses and so forth, from the regulators.

Single or multiple third party coordinators could be used for this sort of process. Examples exist in both. And certainly the discussions in the group at the moment about what this model may best address, in terms of UAS types, would be more larger commercial UAS and high altitude as well, given the systems developed to more normally developed specifically for that type of application.

And there's existing examples of this at moment as well, as I mentioned, with the aviation and VHF links, land mobile, and some models have

been developed previously, as well.

In the group, and for certain aspects, we're sort of considering, well, given all the systems are going to have down sides to them on the access models, what evolutions could be considered that may mitigate some of those that would be useful?

And so, for this system, for example, certainly more automation may be useful, certain UAS missions may be pretty much short-term needing the access fairly quickly, whilst others may be more long-term planning for permanent networks, and so forth.

Also as considerations we may have to look at were possible enforcement or disincentive options, pricing being the obvious example, to prevent spectrum warehousing as well, given the growth of the industry potentially in the future.

Next slide, please.

Terrestrial commercial wireless networks, this one's pretty straightforward. So, current and future terrestrial commercial systems

giving UAS access to the wideband channels that they offer.

Assuming mobile services are licensed exclusively, and then using that network infrastructure to deploy it as required.

Obviously in terms of the specific access that we use, the access control structure automatically accommodated within those systems, and the obvious examples of this would be 4G/5G if that continues to develop.

There has been some discussions about obviously terrestrial networks are optimized for coverage on the ground. They're not really pointing in the air. Trying to minimize that loss of power effectively and focus it to what extent UAS then would need any modification to those networks to provide coverage at higher altitudes than expected.

Next slide, please. Commercial satellite networks. Very similar to the terrestrial, obviously though, that's space-based, using what is currently and future planned for those

different networks.

And within those, a variety of approaches could exist well with different constellations, LEO fixed-satellite, and so forth. And again, using that existing access control mechanism to accommodate the spectrum coordination usage.

Obviously a benefit of satellite, can provide a pretty comprehensive coverage area, where there's not really options for terrestrial or unlicensed coverage, especially oceanic and remote. That would be great.

And also provide some dissimilar redundancy in a sort of complementary function, maybe terrestrial networks as well, can provide a benefit that may not be existing in certain terrestrial aspects.

One aspect of the group still under discussion, but those services can be operated in frequency bands that have safety allocations. And obviously, those generally have a higher regulatory burden there for requiring priority and preemption

of services as required, as well.

Next slide, please. Unlicensed. So, basically everyone operates equally, required to accept and mitigate interference, and therefore having no regulatory basis to claim protection of as required.

And the existing examples as we expect, Wi-Fi, Bluetooth, and ISM, as used by certain UAS applications at this time.

The initial view from the committee at the moment is more UAS is better suited to these given certain limitations, but we could evolve the system further as well, and have some sort of centralized database system to control policy and/or logic to adjust behaviors and potentially enforcement, as needed as well, to provide better assurance of that use of the spectrum as UAS are accessing it.

Next slide. And then dynamic spectrum access. So, there's been a lot of discussions on this about how it would work, and is it complementary, or an independent aspect?

So really to the radios within the UAS would look for the available spectrum, and then independently decide what would be useful to move to as required for secondary and alternative frequencies, as required under the detected RF usage.

Potential for the band to have both primary and secondary UAV spectrum users. So primary would get their assignment from maybe the third party coordinator or another mechanism, and then secondary users could then use on a noninterference basis around this primary use, sort of mixing perhaps some of the previous models we've talked about into sort of more of a hybrid approach there.

Obviously DFS is a good example in the 5 gigahertz band using unlicensed as a potential. And then some of the discussions we had about how that may be then managed better, would be perhaps some sort of, again, a centralized database to control the policy and logic just in, for example, behaviors on sensing, enforcement, and access, and

so forth, to manage airspaces as they change with congestion, and so forth.

Next slide, please. So, not really an access mechanism directly by itself, but a consideration that may need to be looked at, band partitioning, perhaps is needed to partition certain bands based on operational requirements.

Examples of this could be frequency/band partitioning, obviously Guard Bands would need to be considered.

I would say from one of the interviews we had with RTCA, we understand Europe is looking at something like this in the C-band, where there would be a split between satcom and terrestrial within that 5030 to 5091.

Geographic separation also could be a consideration, as well. Obviously though, that may have to have separation distances between the operational areas, which could obviously introduce other complexities.

And then there's an element that even if you did partition, maybe that partitioning would

need to change based on usage requirements.

So, assuming urban and rural have high level and low level traffic respectively, do you need to alter that depending on the different areas, and also would that be a dynamic change as well as traffic levels change? For example, do peak times or off-peak times.

Next slide, please. So those are some of the access models we're considering at the moment. As I said, they are under active discussion, and our interim observations have been considered. Both Carolyn and myself have presented on -- are not too changed from our last presentation we gave at the previous CSMAC.

But certainly, CNPC, Command & Non-Payload Communications, as we call them, spectrum access is critical for integrating UAS into the National Airspace, the NAS. It really is essential.

Obviously wires don't tend to work too well for airborne systems, so we were able to make sure that that is appropriate and managed

appropriately.

As I have mentioned and reiterated, and Carolyn did as well, spectrum is certainly -- these particular applications, it's lots of use cases that need to be considered, both in size, application, airspace requirements, and so forth.

So it can mean that we don't envision just a single solution being applicable to all different types of UAS.

Certainly it's going to be an overlay approach with different, multiple overlapping systems, and the usage could also depend on other parameters as well.

So the flight path, I would say from my background, cost is a consideration as well. Different systems will choose appropriate commander control paths based on cost application, availability, level of required standards, and access as well. So all these need to be considered in the different complexities of the UAS case models.

Certainly we want NTIA and FCC at this

point in time to be informed of the UAS spectrum requirements. Obviously there's still a lot of work ongoing on that, but ensuring that coordination integration across the organization's activities provides a certain consistent regulatory framework, I think is the way looking forward for it, so the industry can continue to develop as it goes forward.

And as part of that as well, providing U.S. leadership to provide that direction and way ahead. Obviously it is an international process, but having U.S. leadership would help direct that in the way that we think would be best.

One of the components as we talked about at the accessing mechanisms and service rules, again, discussion is still ongoing about market versus flexible and rules versus prescriptive approach, but certainly, as I mentioned previously, enabling UAS services to move quickly is certainly a key part of that, and making sure we have a consistent framework going forward would be very useful to that approach.

And that I think is it. Next slide, please. Ah, one last slide. Very important one here.

So, we're still conducting interviews, we're predicting through to about September this year to gather more data. For every time we interview someone, we find someone else that may be a good interviewee as well, so it is a rather long list that we're trying to make sure we prioritize as we go through.

From that, we are developing the report from next month, hoping to have something by the next CSMAC meeting to give an idea of where we're going.

And then towards the end of this year, start of next year, provide those interim findings and conduct this necessary follow-on work to develop that, with a hopeful delivery to March 2021 to the full CSMAC on our final recommendations.

And I think -- the next slide, please.

MEMBER KAHN: That is the last one.

MEMBER ROY: That is the last one?

Great.

There are also backup slides as well that have been provided. They were presented at the last CSMAC meeting. Just provide some context on definitions and other aspects, as well, we thought would be useful to the group, but don't need to be presented again at this meeting.

CO-CHAIR WARREN: Andy, Carolyn, this is Jennifer. Thank you very much.

One of the distinguishing features I think of this subcommittee is the amount of non-traditional outreach that you've had to do and have undertaken with other organizations that either often don't think about spectrum directly, but are very germane to the technology that you're focused on, the UAS.

So, I know that's added a lot of extra work, and so that's much appreciated in your role as co-chairs, and in the committee's attention and participation.

So, thank you with that. Let me open it up to others, CSMAC members, for any questions,

comments.

(No audible response.)

CO-CHAIR WARREN: Well guys, unless someone isn't typing, I think everybody, you know, followed it very closely and will remain active in the subcommittee.

So, I look forward to the progression of the work that you've identified here, and the next step. So, thank you very much.

I think that's it, then. So, moving back to the schedule, and looking at our agenda, you know, we've now, as I said, adopted three items, three reports, and had a detailed update on the progress of the fourth.

I wanted to see if Charles, if you had any immediate reactions, and I'd be happy, of course, to give you the floor, but we certainly look forward to receiving feedback not only on the reception of the report within NTIA, but also on any feedback in the near term on the direction that you would like us to go.

Obviously, Working Group 1 and now the

committee has made some suggestion with respect to furthering the non-legislative options, but I wanted to see if there's anything now, or if we should wait for a time for you all to spend a little time reading it and talking amongst yourself?

Charles?

MR. COOPER: Thank you, Jennifer. And I appreciate all the fabulous work of the committee and the subcommittees here.

So, NTIA OSM is in receipt of the three final reports, which are also publicly available on our website, so we have lots of reading to do.

And bear with that first one, understanding that there is a recommendation of some possible follow-up work, so Office of Spectrum Management will take a very close look at that in the near term.

On Study Question 2, with the non-federal spectrum use, it was helpful to hear it, you know, be able to articulate why NTIA was asking that question, and certainly identify the limited data sets that are available, so that will

also be a helpful report.

And of course, Study Group Number 3, a topic that's kind of close to my heart going back to my former work at the FCC with interference mitigation, one of the top items that I heard was regard to possible consideration of these unique identifiers in the future bands that may be easier to implement.

And also highlighting that it's not only an FCC issue, but it's also an NTIA issue with our own authorization rules that the agencies want for their operation of their systems.

And then, Study Question Number 4, this an ongoing one as (telephonic interference) reported. It's got a lot of federal concern and watchful observations, not only from NTIA, but also from the FCC and the FAA.

So, thank you very much, and we'll be back in touch.

CO-CHAIR WARREN: We're counting on that, Charles, thank you. And even though I know that -- I was just going to say, even though I know

each of the working groups or subcommittees thanked the liaisons, I think we want to thank all of the liaisons one more time, Charles, from NTIA, as well as our DFO, Dave Reed, and Antonio, for their support throughout.

I don't want to leave them unmentioned because really, they make all these meetings happen. So, thank you for that. Charla, do you want to --

CO-CHAIR RATH: No, I was just going to echo that. I feel like this year has gone particularly well because of the deep engagement of people at NTIA.

So, you know, there's been some complications and some, you know, tough sidebar conversations, so I really do appreciate your engagement and how quickly you've been able to respond. Thanks.

CO-CHAIR WARREN: So with that, I think next on the agenda is really to open this up for any public comment.

CO-CHAIR RATH: For public?

CO-CHAIR WARREN: Yep, if there's any member of the public that has a question, this is your opportunity.

(No audible response.)

MR. RICHARDSON: This is Antonio. The public has been unmuted, so therefore ask away.

CO-CHAIR WARREN: We'll give it a few seconds, and if we don't hear anybody speaking up, we will turn to closing remark.

(No audible response.)

CO-CHAIR WARREN: Okay. I like to pause just so that people have an opportunity to figure out technology. Just because we've been there. So, it seems like there are no comments or questions from the public.

So, we will just proceed to closing remark, which, you know, really just, there's I think that the comments we made at the beginning with commending everybody for all the work, that the evidence of that is clearly in the reports, the depth and breadth of the report that we adopted, that the presentations only, you know, are

top-level to the real work that's reflected in those products.

So, our thanks to you all, and we look forward to NTIA's feedback on the next steps, particularly where we've made a recommendation or two for where that might be, and of course, the continued work.

Carolyn and Andy, you may find you have a lot of new members.

MEMBER ROY: Yes.

CO-CHAIR WARREN: To your committee pending for the work task from NTIA.

But Charla, let me turn it over to you.

CO-CHAIR RATH: Yeah, thanks. No, true to form, Jennifer. You've basically said everything that I was going to say, including the last bit about UAS getting some new members.

But that's it for me as well, so you know, again, thank you to everyone, and looking forward to, you know, again to hearing from NTIA and to, you know, continuing our work, and hopefully to actually seeing you all in person sometime soon.

CO-CHAIR WARREN: Okay. Then over and out, and enjoy the hour that you have back.

(Whereupon, the above-entitled matter went off the record at 3:04 p.m.)