

U.S. DEPARTMENT OF COMMERCE

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COMMERCE SPECTRUM MANAGEMENT
ADVISORY COMMITTEE (CSMAC)

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MEETING

+ + + + +

WEDNESDAY
APRIL 22, 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
 AUDREY ALLISON, Vice President, Global Spectrum Management, Boeing
 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, Comsearch

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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

RUTH PRITCHARD-KELLY, Vice President Regulatory
Affairs, OneWeb

MARK RACEK, Senior Director of Spectrum Policy,
Ericsson

DENNIS ROBERSON, Research Professor of Computer
Science, Illinois Institute of Technology

ANDREW ROY, Director of Engineering Services,
Aviation Spectrum Resources

STEVE SHARKEY, Vice President, Government
Affairs, Technology and Engineering
Policy, T-Mobile US, Inc.

MIRIAM 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

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ALSO PRESENT

DAVID REED, Designated Federal Officer
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
ANTONIO RICHARDSON

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

1:03 p.m.

MR. KINKOPH: Good afternoon, and thank you all for joining us. I hope you're all staying safe and healthy during this unusual and difficult time for our country, and I'd like to welcome you to our first virtual CSMAC meeting. At NTIA, most of our employees are teleworking, but we have maintained the full continuity of operations across our offices.

On the spectrum front, we've made progress on a number of issues since the last meeting with CSMAC. Most recently, we've been working with the businesses, federal stakeholders, and the FCC to make sure our response to connectivity needs remain flexibility. In this time of increased teleworking, we've seen increased demands on the capacity and coverage capabilities of our communication networks.

One way federal agencies can help is by enabling additional sharing of spectrum and by short-term capacity of commercial services. The

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FCC has received a number of requests for short-term sharing of frequencies, and NTIA has been working with agencies to accommodate these requests. When agencies agree on the terms, the FCC grants a special temporary authority for commercial carriers to share federal frequencies for a set period of time.

In recent weeks, the FCC has issued a number of these grants to increase band capacity throughout the country, and I'll give you a few examples of some that occurred recently. Thirty-three wireless internet service providers received grants to use below 45 megahertz of spectrum and 5.9 gigahertz band for 60 days which will help bolster service to rural communities in 29 states.

AT&T and Verizon received grants to use AWS spectrum to help meet wireless broadband needs across the country. U.S. Cellular received a grant to use spectrum license to AWS-3 for 60 days to provide additional coverage in parts of four states, and AT&T received a grant of additional

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AWS-4 spectrum currently licensed to DISH -- excuse me, just for Puerto Rico, U.S. Virgin Islands for 60 days to strengthen network capacity.

And looking back to earlier this year, President Trump's 2021 budget had a number of important spectrum-related items. The budget asked Congress for an additional 25 million to modernize America's spectrum management system to accommodate advanced technologies. NTIA would use these resources to create a secure, flexible, and automated spectrum management system.

In addition, the budget calls for increased funding to improve the disparity of our telecommunication infrastructure and upgrade advanced communications research at the Institute for Telecommunication Sciences, a research lab in Colorado. With that, that'll end my opening remarks here, and I'll turn it back over to Jennifer and Charla. Thank you.

CO-CHAIR WARREN: Thank you, Doug. Welcome everybody to our April 22nd CSMAC meeting.

This date was picked well in advance of the current

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environment in which we find ourselves, and my compliments to NTIA and Doug, the whole team on the continuity and hard work to make sure this meeting continued to go forward which is really just an amazing professional commitment to the CSMAC and its work. So thank you to you and OSM team.

MR. KINKOPH: Thank you.

CO-CHAIR WARREN: Also, before we get started, and I know it's in advance of the work that the subgroups are going to share with us today and report out on today. But just wanted -- Charla and I want to thank everyone, from the co-chairs to all of the members, for all of the work that's been put in, particularly during this period when there's obviously a lot of competing personal and other demands.

Again, I'm really appreciative of that, and I think, Doug, you and your team will see that your commitment is matched by the work that this group is putting in. So again, compliments to the CSMAC membership. With that, I'm going to pass

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it over to Charla. Charla?

CO-CHAIR RATH: Yep, great. Thank you, Jennifer, and just to underscore everything that Jennifer said about thanks to NTIA and to the CSMAC and all the incredible work that's been going on. I've been participating in it but just have been reminded as reviewing the documents just what people have been doing. And again, we really appreciate all the work that's gone into today's meeting.

What we're going to do is the roll call next and because we're all remote, what I'm going to do this time is just read out names and ask for people to indicate whether they're here or not. I believe almost everybody is on, but I just want to double check. First --

MR. REED: Charla?

CO-CHAIR RATH: Yep?

MR. REED: Charla, this is Dave. Can I interrupt for a minute?

CO-CHAIR RATH: Sure.

MR. REED: Tony, I don't know if you're

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able to increase capacity, but apparently we've exceeded capacity and some aren't able to get in.

MR. ROBINSON: I just upgraded it. I'm going back to Chris right now.

MR. REED: Okay, good. Thank you. Sorry about that, Charla.

CO-CHAIR RATH: No, thanks, Dave. Appreciate it. Well, our online -- our first remote meeting is pretty popular. So as I said, actually, just a couple of housekeeping reminders.

I think everybody knows that they need to be both on the Webex and to call in, in order to participate.

And then the other thing is that unlike the way you're usually used to doing this, you can't raise your hand because Jennifer and I can't see that in order to put your name in line to be heard the same as putting your tent cards up, just to send a chat out to everyone. And be sure to send it to everyone so that we can all -- same as you would and everybody can see who wants to speak next.

So just a reminder, and we'll remind people throughout just to make sure.

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In any event, just running down through the list, I've got Claude Aiken. Claude, are you here? I know everybody will take a minute to get off mute. Audrey?

MR. AIKEN: Claude's there. Claude's there.

CO-CHAIR RATH: Okay, okay, good. Audrey?

MS. ALLISON: Yes, I'm here. Thank you.

CO-CHAIR RATH: Mary Brown?

MS. BROWN: Here.

CO-CHAIR RATH: Michael Calabrese? Michael, if you're on mute. I thought I saw you earlier. So Jeff Cohen?

(Simultaneous speaking.)

CO-CHAIR RATH: Sorry. I'm sorry. Jeff, are you on?

PARTICIPANT: He's on Webex. He has no audio right now.

CO-CHAIR WARREN: He may have been one of the ones waiting for the capacity to be expanded.

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CO-CHAIR RATH: Okay. So Mark Crosby?

MR. CROSBY: Here. I'm on.

CO-CHAIR RATH: Tom Dombrowsky?

(No audible response.)

CO-CHAIR RATH: Mark Gibson?

MR. GIBSON: I'm here.

CO-CHAIR RATH: Dale Hatfield.

MR. HATFIELD: I'm here.

CO-CHAIR RATH: Carolyn Kahn?

MS. KAHN: Here.

CO-CHAIR RATH: Paul Kolodzy? I see you, Paul.

MR. ROBINSON: He's another one --

CO-CHAIR WARREN: He was having trouble with the audio and waiting for --

(Simultaneous speaking.)

CO-CHAIR RATH: Oh, okay, yes. Mark Lewellen? I saw Mark was on Webex too. He may be another one.

CO-CHAIR WARREN: Charla, I'm going to interrupt a second just because several members are blocked. It's not just Paul. We've got four

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or five that are not able to get on to this telephone, the call.

CO-CHAIR RATH: Why don't we pause for a minute and just see if the increase is helping folks.

PARTICIPANT: And while we're paused, we're not seeing the -- I'm not seeing the agenda anymore. Is that operator error? Can somebody else put it in the chat? Are we supposed to be still be seeing it?

PARTICIPANT: Yeah, I'm not seeing it.

CO-CHAIR RATH: Yeah, I'm not seeing it. It looks like it's being blocked by -- and somebody maybe tried to take over the shared content screen.

PARTICIPANT: I think it was Mary Brown. I think she's always trying to take over stuff on Webex. That's my guess.

(Laughter.)

PARTICIPANT: Great product. Great product. Great product.

PARTICIPANT: Yeah, this is coming

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from Bryan Tramont. Okay, Bryan.

CO-CHAIR RATH: I see the agenda again, and how are folks doing? Paul? Claude? Michael? Mark Racek?

MR. ROBINSON: Yeah, this is Antonio

--

(Simultaneous speaking.)

PARTICIPANT: I was just wondering if they need to hang up and call back in now that the capacity has expanded.

MR. ROBINSON: I think I would have to end up bringing the whole thing down and bringing it back up. That would be the only way to probably increase the capacity. That's the only thing I can think of because I've increased it. Just it's not giving me the read that I had officially increased yet.

CO-CHAIR RATH: Okay. So we're exploring new territory here. I would guess that that may be what we should do. I hate to say it, but why don't you bring down the bridge and then we can all sign back in and just to call back in.

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PARTICIPANT: Will we do Webex as well or just the audio?

CO-CHAIR RATH: No, this is just the audio, right, Antonio?

MR. ROBINSON: Yes, this is just the audio.

CO-CHAIR RATH: Yeah, they're completely separated, and to remind people, you actually have to do both. You cannot do the audio through the Webex.

MR. GIBSON: It might be worth reminding people to allow the CSMAC people to get on the first bridge first before non-CSMAC get on.

MR. ROBINSON: So I'm going to hang up and do this again.

(Whereupon, the above-entitled matter went off the record at 1:14 p.m. and resumed at 1:29 p.m.)

CO-CHAIR RATH: All right, guys. Briefly off mute, and I am going to -- one more time, I'm going to try and get a full roll call this time. And hopefully, we'll be able to make

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it work. Claude, are you on? I see you, Claude.
Are you -- and you're muted. There you go. Can
you hear us?

MR. AIKEN: Can you hear me?

CO-CHAIR RATH: Great, perfect.

MR. AIKEN: All right. I'm here.

CO-CHAIR RATH: Audrey, I heard you,
so I'm assuming you're good. Mary? Mary Brown?

(No audible response.)

CO-CHAIR RATH: Mike Calabrese, I saw
you.

MR. CALABRESE: I'm here.

CO-CHAIR RATH: Jeff Cohen?

MR. COHEN: I'm here.

CO-CHAIR RATH: Mark Crosby? Mark,
are you on and not muted?

(No audible response.)

CO-CHAIR RATH: Okay. Tom
Dombrowsky, I think we determined he's not on.
Mark Gibson?

MR. GIBSON: I'm here.

CO-CHAIR RATH: Dale Hatfield?

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(No audible response.)

CO-CHAIR RATH: Carolyn Kahn?

(No audible response.)

CO-CHAIR RATH: Okay. I don't see -- it looks like some people may have dropped off the Webex now. I'll keep going.

MS. PRITCHARD-KELLY: I dropped off of everything and came back just on Webex.

CO-CHAIR RATH: Who was that? I'm sorry.

MS. PRITCHARD-KELLY: Sorry. It's Ruth Pritchard-Kelly.

CO-CHAIR RATH: Thank you, Ruth. Paul Kolodzy?

MR. KOLODZY: I am on the Webex and on the bridge. I can hang up off the bridge if you desire.

CO-CHAIR RATH: Hang up off the bridge. If you hear me, you hear the Webex because I hung up off the bridge.

MR. KOLODZY: Okay. I'm hanging up off the bridge.

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CO-CHAIR RATH: Mark Lewellen?

MR. LEWELLEN: I'm here, I think.

CO-CHAIR RATH: Jennifer Manner.

MS. MANNER: I'm here. Thank you.

CO-CHAIR RATH: Mark McHenry?

MR. McHENRY: Here.

CO-CHAIR RATH: Donna?

PARTICIPANT: She was on the bridge a
minute ago.

CO-CHAIR RATH: Okay.

PARTICIPANT: She might be muted.

CO-CHAIR RATH: Wayne?

(No audible response.)

CO-CHAIR RATH: Carl Povelites?

MR. POVELITES: Here.

CO-CHAIR RATH: Mark Racek?

MR. RACEK: I'm here.

CO-CHAIR RATH: Dennis?

MR. ROBERSON: I'm here. Can you hear
me?

CO-CHAIR RATH: Yep.

MR. ROBERSON: Good.

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CO-CHAIR RATH: Andy?

MR. ROY: Here.

CO-CHAIR RATH: Steve?

MR. SHARKEY: I'm here. Thanks.

CO-CHAIR RATH: Mariam?

MS. SOROND: I'm here.

CO-CHAIR RATH: Bryan?

MR. TRAMONT: Yes, I'm here.

CO-CHAIR RATH: Jennifer Warren, I know you're here. Chris Weasler? Chris, are you here?

(No audible response.)

CO-CHAIR RATH: And Bob Weller?

MR. WELLER: Hello. I'm still here.

CO-CHAIR RATH: Okay. So we're missing -- okay, everybody, you can put yourself back on mute.

PARTICIPANT: There's a lot of feedback.

CO-CHAIR RATH: Yeah, I'm going to run through again the people who did not say they were on. Mary Brown?

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MS. BROWN: I'm on.

CO-CHAIR RATH: Great. Mark Crosby?

(No audible response.)

CO-CHAIR RATH: Dale Hatfield?

MR. HATFIELD: I'm on.

CO-CHAIR RATH: Carolyn?

MS. KAHN: Here.

CO-CHAIR RATH: Donna?

(No audible response.)

CO-CHAIR RATH: And Chris?

(No audible response.)

CO-CHAIR RATH: Okay. So it seems like Mark Crosby, Donna --

MR. CROSBY: I'm on.

CO-CHAIR RATH: Okay. Mark, you're on. Good, okay. Donna? Chris Weasler? I think that's it, Donna and Chris Weasler.

MS. MANNER: Charla, it's Jennifer. Is Mary Brown on? She didn't answer before.

CO-CHAIR RATH: Actually, I'm sorry, Jennifer. I couldn't quite hear you.

MS. BROWN: Mary Brown is on. Mary

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Brown is on.

CO-CHAIR RATH: Yeah. No, the only two people that I know of who I can't talk to is Donna and Chris.

PARTICIPANT: Mark Crosby needs to mute. Mark Crosby needs to mute.

MR. CROSBY: I am on mute.

CO-CHAIR RATH: It doesn't show mute. There you go.

PARTICIPANT: There you go. Thank you.

CO-CHAIR RATH: Yeah. So okay, so Donna and Chris are the only two that I am not --

MS. MANNER: Charla, I texted Donna, so hopefully --

CO-CHAIR RATH: Okay. I see Donna has actually shown up now. Is that -- can you see if it's Donna?

MS. MANNER: She says it's not unmuting her.

CO-CHAIR RATH: Weird.

MS. MANNER: So that's what she just

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texted me. So maybe --

CO-CHAIR RATH: We may have to have somebody bring her in because that's clearly an issue. Okay. Well, we should just get going then. Jennifer, what do you think?

CO-CHAIR WARREN: Yeah, I guess we have to. I just want to make sure that the chat messaging now is working for everybody. Is everybody receiving all the messages, like, the last one from Donna?

PARTICIPANT: Yes, yeah, chat's working.

CO-CHAIR WARREN: Okay. Donna is asking, is somebody going to bring me in? Can she bridge in from the phone somehow, and can she still participate by phone?

CO-CHAIR RATH: Everybody would have to go back on the phone for her to be able to hear everyone, I think, or maybe not. Donna, can you hear us? Okay, maybe not. Maybe she'd have to then just --

MS. MANNER: I'm texting her to see,

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so hold on one second. I'm just asking if she can hear us. I figured that might be more efficient.

Yeah, she can hear us, Charla. So she's on the Webex. She's just muted. So it sounds like someone has an unmuted line. Maybe I should give her a mobile phone number. I can give you her -- but you don't need that for this. She should be able to get on the Webex.

MR. REED: Yeah, it should be open to everyone.

MS. MANNER: She says she still -- she can't unmute, though.

CO-CHAIR RATH: It's not showing her as muted, though.

MS. MANNER: I'll tell her, not showing you as that.

MR. REED: Is there an option to use computer audio that she hasn't found?

MS. MANNER: I'll ask her that.

MS. SOROND: Yeah, I think everyone should have audio menus. There's a speaker microphone.

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MS. MANNER: I'm going to suggest maybe she should sign back on.

MR. REED: Yeah, that's probably a good idea. That's usually how I send questions.

MS. MANNER: That's how I usually fix things. Okay. So I have a note in to her. So I'm working with her, Charla, just on texting, so --

MR. REED: Since she can hear, I would suggest we keep going forward.

CO-CHAIR RATH: Yeah, and I think -- I know Chris was on earlier.

MR. WEASLER: Yes, I'm here.

CO-CHAIR RATH: Oh, good. Thank you. Okay. So Donna is the only person who's having problems still. So we'll --

CO-CHAIR WARREN: Well, she'll be able to hear Charles' spectrum policy update. So perhaps we should move forward on that front. We'd actually almost be on time. And in the interim, if Antonio is able to maybe work with Donna offline to figure out how we can fix her access issue, but

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we can still move forward with the policy update.

Does that sound like a possibility?

CO-CHAIR RATH: That works for me, if NTIA is fine with that. Again, we want to make sure that we're doing everything as it should be done. And Donna, you can chat with us. If you just let us know if that's okay with you, you'll call in the bridge so you can speak at the times when you need to.

PARTICIPANT: Charla and Jennifer?

CO-CHAIR RATH: Yeah.

PARTICIPANT: Are we ready then?

CO-CHAIR RATH: I'm still waiting to get confirmation on it that she was okay with calling in.

PARTICIPANT: Yeah, okay.

CO-CHAIR RATH: And if she would -- Donna, if you just say something in chat, I know you can't -- for some reason, your audio is still not working, but we'd like to move forward with Charles. Oh, yeah. You were going to call into the bridge so that we could hear you.

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PARTICIPANT: I'm not sure if that worked.

CO-CHAIR RATH: You can call into the bridge if that works. If not, somebody can conference her in. Yeah, okay. She's calling in. Okay, great. Charles, why don't you get started. I just wanted to make sure that all of the CSMAC members who could attend had a way of communicating with us, and it looks like we're good.

And just a reminder to everybody, while others are talking, put it on mute. And for the members of the public, please keep yourselves muted until the end to the period of time it's available for public comment. Thank you. And over to you, Charles. And thank you, everyone, for bearing with us on this.

MR. COOPER: Thank you, Charla, and thanks to everyone for their patience as we join the rest of America in going virtual. As Doug and others have said already, we hope all of you and all of your family members are well. We thank you for your participation and work in the CSMAC.

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We have a lot on our agenda for the CSMAC cycle, and I want to assure you that NTIA and the Office of Spectrum Management are continuing to pursue our statutory missions and we have. And by that, just from March 1 to April 7, for example, we continue to process our spectrum assignments and equipment certifications for our users. It's totaled to over 10,000 spectrum assignments and 17 equipment certifications.

As Doug mentioned earlier, we've been working to process a large number of STAs to ensure sufficient spectrum access during this current health crisis. Also, we'll continue to work on pioneering and implementing structured sharing approaches, complying with Congressional mandates and the MOBILE NOW Act and other legislation, and following up on the October 2018 Presidential Memorandum on spectrum.

I'm happy to provide you with the spectrum update today affirming our commitment to the critical importance of our spectrum-based federal operations and our commercial industries.

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Let's begin with efforts to develop and implement sharing approaches in the key mid-band spectrum.

As I noted during the last CSMAC meeting, finding available spectrum that industry can use for 5G networks and services is a high priority goal of this administration as well as Congress. With the 3550 to 3650 Citizens Broadband Radio Service, the FCC has begun the process in the next few months to auction off the priority access licenses, PALs. That'll be starting July 23rd of this year. We are hopeful that this date will hold and that this spectrum band can be made available.

The General Authorized Access, or otherwise called licensed-by-rule operations, have already been launched, and we will continue to support the progress of these market developments.

We are working with the providers and operators of SAS and ESC equipment to help fine tune where needed the operations of these new capabilities as they are implemented in networks and systems in the dynamic protection areas. Notably, an

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informal industry/government collaboration group has been instrumental in helping development and to implement these technologies.

Another element of the CBRS rollout from a federal perspective will be implementing the approved transition plan for sharing in the 3550 to 3650 band under the Commercial Spectrum Enhancement Act as amended. It entails utilizing funds from the Spectrum Relocation Fund, otherwise known as the SRF, and will be deposited after a successful PAL auction in order to cover the costs the Department of Defense is incurring to enable commercial access while ensuring critical military radars are protected.

I would like to mention briefly two key actions our partner, the FCC, is taking to make additional spectrum available. In late February, the Commission adopted an order setting aside 280 megahertz in the C-band in the 3.7 to 3.9 gigahertz C-Band of flexible use, including 5G services. The FCC signaled its plan to auction spectrum this year. Ultimately adding the spectrum to what has

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been established with CBRS will create a large, contiguous block of mid-band spectrum, 3550 to 3980 megahertz for licensed and licensed-by-rule services.

Additionally, the FCC has proposed to make 1,200 megahertz of spectrum available for unlicensed services in the 6 gigahertz band. That proposal is scheduled to be voted on during the Commission's open meeting for tomorrow. So working together in our different roles and capacities, the various components of the federal government are working diligently to do all we can to manage spectrum effectively so it can be used efficiently and meet the needs of the American public.

Meanwhile, NTIA has completed a draft report to Congress as required by the MOBILE NOW Act on the potential for making available spectrum in the 3100 to 3550 megahertz band for commercial wireless services. This follows a technical report focused on the 3450 to 3550 sub-band which was published in late January.

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Both the technical report and the MOBILE NOW report conclude that, pending further study and effort as to precisely how it can be achieved, the 3450 to 3550 megahertz sub-band can be repurposed for commercial use or retaining access to the band for key military radar systems.

Frequencies below that, while not off the table, they present far more challenges that would need to be overcome.

Related to the 3 gigahertz band efforts is our ongoing work to develop the concept of what we call the incumbent informal capability, IIC, which is intended to facilitate additional spectrum sharing. It will allow a federal agency to provide and update information on its specific use of a given shared band through a database and portal system.

NTIA will work with our agency partners to develop and refine this concept. Although this remains in the planning and discussion stages, we are very excited about the IIC and more generally about the movement to automated spectrum management

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systems.

Meanwhile, NTIA continues to develop implementation plans for realizing the presidential spectrum management vision which was outlined in his Presidential Memorandum of 2018.

This process includes making sure that our spectrum management initiatives, such as the development of the IIC, advance the gains of the Presidential Memo which include developing innovative spectrum use and spectrum sharing methods, tools, and technologies.

As directed in the Presidential Memorandum, we are currently working to finalize the draft of our second annual spectrum repurposing incentives report. FCC and NTIA efforts over the years repurposed spectrum for commercial wireless services, including bands the carriers can use for (audio interference) and made 6,154.5 megahertz of spectrum available for licensed services and a further 15.89 gigahertz available on licensed operations. Of these amounts, about 1 gigahertz of licensed spectrum has been in the mid-band range

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between 1 to 6 gigahertz.

In addition, another 6,750 megahertz is in the pipeline for consideration for licensed services, including 590 megahertz in the mid-band range. These numbers reflect a longstanding shared commitment by the FCC, NTIA, and the federal agencies to make sure American's world leading technology companies have access to the spectrum needed to develop and make available innovative technologies and services, including 5G, next-gen wi-fi, and other broadband activity solutions.

Other current activities stemming from the Presidential Memorandum include our ongoing look at the current federal usage of the spectrum bands, including the mid-band. We have been gathering data from the agencies in an effort to develop a more granular method of quantifying federal spectrum usage.

So to conclude my remarks, thank you to all those for participating today for your steadfast work on these very important issues. Gotten off to a great start on the topics for

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exploring this cycle, and I'm really pleased that you continue to pursue this work with your characteristic energy and dedication. I'm looking forward to the discussion reports, and I turn the mic back over to the co-chairs.

CO-CHAIR RATH: Thank you, Charles. Jennifer, do you want to move to the next agenda item? So Jennifer, I'm having trouble hearing you, Jennifer.

CO-CHAIR WARREN: Can you hear me now?

CO-CHAIR RATH: It's a little bit better, but still --

CO-CHAIR WARREN: Is this any better?

CO-CHAIR RATH: Much better.

CO-CHAIR WARREN: Okay. Apparently, headphones don't work. Okay. The things we learn. So thank you very much, Charles, as I was going to say before. We too have been very busy, and I think that on behalf of the CSMAC, we appreciate the details and also your sharing with us the status of your work on the mid-band.

I want to, as usual -- though, I'll

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remind people to use the chat function to ask for the floor. I want to open it up for any questions that the members of CSMAC may have with respect to your report. Are there any questions? Charles?

CO-CHAIR RATH: And Jennifer, just a moment for an administrative point of view is just wondering if Donna was able to connect so that we can hear her.

MR. REED: It seems like she has audio and is unmuted.

CO-CHAIR RATH: So I haven't heard from Donna, but I see Dennis Roberson. Was that Dennis who just spoke? Or Dennis, did you want me to ask a question because you're not being heard? So Dennis --

MR. ROBERSON: I'm sorry. I just posted the question, and I don't know whether it's out of bounds or not. But there's obviously a lot of discussion around on the Ligado decision. I wondered if there was a comment on that.

CO-CHAIR WARREN: So Charles, I

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realize this is outside of our CSMAC space. But as a general spectrum policy update, would you have any comment you would like to make? And while you're doing that, I'll add the other question that has just been posted, in addition to any comments or update on the National Spectrum Strategy from Bob Weller.

MR. COOPER: Thank you. This is Charles. So the first question with regard to Ligado, yes, as everyone is certainly aware, NTIA did provide comments into the docket, and we don't have anything further comment at this time. With the spectrum strategy question, we are working on the work elements pursuant to the Presidential Memorandum of 2018 such as going and looking at the future and present use cases for the federal agencies and also those work items. So those are the present work items we're focusing on. Thank you.

CO-CHAIR WARREN: Anything here? Are there other questions for Charles?

MR. GIBSON: Yes, this is Mark Gibson.

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I have one quick question.

CO-CHAIR WARREN: Wait. And Mark, can I just say one thing? Ignore the screen changing. That's intentional. We're just doing a smooth transition to the next phase of the meeting. Go ahead, Mark.

MR. GIBSON: Okay. Charles, thanks for the update. You talked about the informal incumbent portal. I forget what you called it. Will that be used for CBRS as well, or is that going to be for other shared bands? And if for other bands, what other shared bands are you thinking about for that?

MR. COOPER: So thank you, Mark, for the question, and that's with regards to the incumbent informal capability I see, which I mentioned in my remarks. This is an ongoing initiative that NTIA is running, looking at developing -- can we develop a common spectrum sharing regime for federal bands? Maybe not necessarily exclusive those to mid-band but other bands as well.

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We've had a lot of lessons learned from spectrum sharpening, both on the FCC side and from the NTIA side with AWS-3. So NTIA believes the time is ripe for us to take some lessons learned from that and see if we can come up with a common architecture on how to share bands going forward.

MR. GIBSON: Okay. Thank you.

CO-CHAIR WARREN: Are there any other questions? I don't see anyone in the chat space indicating that you have a question. So if not, I am, again, going to say, thank you, Charles, very much for making yourself available for sharing your report and also for fielding questions.

With that, I would like to turn it over to the next phase of our meeting which is the reports from the various working groups and starting with Working Group 1 which is focused on spectrum governance. And our two co-chairs are Jennifer Manner and Mary Brown, and I believe I'm handing it over to Jennifer.

MS. MANNER: That's correct. Thank you very much. Can everyone hear me okay?

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CO-CHAIR WARREN: Yes.

MS. MANNER: So good afternoon, everyone. On behalf of Mary, myself, and you'll see all various names in Attachment A, our terrific working group, we're very pleased today to walk over where we are on our work effort. And so I just want to walk through a few slides, and then we'll walk through the different options we have and then some other observations and then next steps.

But I think the most important thing that folks know is that we do have a draft report.

We're not ready to present that yet, but we are certainly well on our way. So just a reminder of what our mandate is on the current slide, really looking at spectrum management being optimized and whether there's a new approach or structure and characteristics. So we've been spending our time very much looking at our mandate, and here's the view that we took at the last CSMAC public meeting when we were all there in person which was lovely.

But we generally reached agreement that

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the country's current approach for managing the use of spectrum is no longer effectively serving the needs of the entire stakeholder community and that there was a need for reform. So we also recognize that these issues need to be handled with speed and skill and to ensure that the United States is making the most of its critical national resources. So we continue with that view, and that's really where we get to today which is the status of the report.

So first off, we've developed several options, and you'll see. I'll note we've had a couple changes in terms of how many options we have just because drilling down in the past few months, we've realized that there are more options that we had originally envisioned, not a lot but one more. Our goal is really to provide a basis for the examination of the best spectrum management governance model to meet the U.S. goals and also the goals of the still-to-be-released National Spectrum Strategy.

What was really interesting, and we've

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done quite an extensive analysis on this is we really couldn't located any real literature or research on reforming the U.S. spectrum management.

So it was largely an issue of firsthand knowledge what we put together by Working Group 1. And similarly, we did spend some time looking at the international process, and that didn't provide much on that either.

So sorry, my slides are blocked by my view. So we thought it was necessary to put together a range of options, and we're hoping that this review of ideas will provide NTIA and others to build on our work. We continue to not to endorse any single option but to really share what the different choices are.

So just an update on our working methods. We've been a busy little group. We've held more than 15 meetings. We've been spending time reviewing statutes, regulations, and so forth to understand the current environment, and we spent some time examining the international spectrum management regimes to see about any lessons

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learned.

We solicited contributions from the working group on different governance ideas with -- our goal was really to develop a reasonable array of available governance model options. We had a distinguished speaker thanks to Peter Tenhula spending some time with us on IRAC. Thanks to Dale Hatfield and the UC law students. We were able to -- we were presented with a history of the present structure.

We decided on operational rules for this phase of the investigation. And even though we don't have the National Spectrum Strategy that one day we would all like to read, we did put forward our best ideas on improving spectrum governance.

And as I said, we're really proud that we have our first draft ready for review by Working Group 1 and then for the summer's meeting with the CSMAC.

Before I turn it over to Mary, just wanted to walk through our options and how we broke them up, and Mary and I spent some time really thinking through this and there's really three key

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areas: proposals to stand up a new agency, and we found three options there, a full-service spectrum agency, a Unity Agency, and a spectrum resource agency, then proposals to repurpose and expand the authority of the existing agency, whether that's a new FCC, a new NTIA.

And then the other, and Mary is going to turn this back over to me, to really talk about proposals that could attach to other options or stand on their own, and I think both the R&D option and updated MOU are things that need to be considered no matter what. One of the things we found while going through all these options is that we all felt there was a need for more research and development being done in this area, and that probably will be a new part of an agency or a new agency or a new function. So we'll walk through that as well. So with that Mary, I'll turn it over to you. And if you just tell me when to change the slide, I'm happy to do that.

MS. BROWN: Sure. Thank you very much. I'm going to take us through some of the

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options and what had changed and what has not and try to give you a feel for kind of where we are.

As Jennifer said, the first phase of our working group was just trying to throw some different concepts out and suss out the different options.

And this new full-service spectrum agency was one of the first ones that bubbled up to the top.

Again, no change from last meeting, but what this would do is take all spectrum policy/management/planning, licensing/authorization, equipment function, sharing, enforcement, anything that has to do with spectrum and pull it in to a new agency. So parts of the FCC and parts of the NTIA would officially be divested and assigned to this new agency.

We still have no figured out as a group whether this is an independent agency in the vein of the FCC. That is -- Jennifer, I think we just lost the sharing capacity. I don't see the slide.

There we go, whether this is in the vein of the FCC, as an independent agency such as the FCC, or whether it is an agency within the Executive Branch.

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We haven't tumbled to that.

But just in terms of the kinds of issues that we're talking about with respect to this option, and let me just say the interesting thing about this for me has been actually taking some of the PowerPoints and turning it into written text because the process of writing about this stuff tends to show where the gaps are or where the problems are or where the benefits are. So we're really able to sort of drill down a little bit better, I think, now that we have a first draft of a report.

But some of the things that we've talked about as a group with respect this particular proposal is, of course, would be a new agency and there would be functions and people transferring to it. And that brings with it a period of uncertainty, and not just for your human resources but a period of uncertainty with respect to the impact on decisions. And there are a lot of collateral issues that come with that, then we have to consider, are there any obvious ways to mitigate

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against essentially slowing down decision-making while you transfer responsibilities from the existing structure to the new?

We've also observed that -- and this is true of this proposal as well as the next one -- that since you're transferring everything into spectrum into this new entity, essentially what you're doing is you're putting a significant input of our gross domestic product and our national defense in the hands of a few. In this case, it would be a Board of Directors.

And we've got to have -- we've got to find a way to stand up the agency quickly with a level of domain expertise that will inspire confidence. It's not a small problem here to try to do that when you're creating an entirely new entity.

So those are some of the conversations we're having around the full-service spectrum agency. And before we go on, let me just say the goal of our report is to highlight what we think some of the great things are about each proposal

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but also not to hide some of the negatives because no one has written about this topic before. We think it's useful that the working group bubbles up a series of options where we talk about each of these ideas in terms of what's good about them or potential drawbacks of them so that people can then build on that work in the future. So let's switch to the next slide.

So the next proposal we're calling the Unity Agency. And if you think conceptually about this, this is sort of saying, well, if we're going to take all of the spectrum-related things and equipment and licensing and authorization and everything and putting it into a spectrum agency, why don't we just combine NTIA and FCC into a new Unity Agency. So this is, like, throwing up your hands and saying, well, put it all together.

And so it would have to have all of our spectrum functions, both on the federal side and the commercial side but also for non-spectrum functions. So we recognize the non-spectrum piece is not part of CSMAC's remit, but it is a logical

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approach to solving spectrum governance. So we want to put it forward to say that we've thought about this proposal as well. We're not trying to analyze the non-spectrum issues that would come up. We're just trying to focus on the spectrum issues. But the idea here is to put the two agencies completely together.

And here what we're talking about is potentially putting this into the Executive Branch in sort of like an Environmental Protection Agency and independent. It's not a subsidiary to an existing cabinet-run department but as its own agency with the associated limitations on the administrator.

The administrator might have a term longer than a sitting president. There might be certain limitations on the ability of the president to dismiss an administrator if he didn't like his or her views, that sort of thing. And their mission would be, of course, to decide what's best for the nation as a whole.

This proposal, the thing that has

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struck us in our conversation is it does the most to potentially eliminate redundant functions. So the elimination of redundant functions might be possible here. It has all of the issues with respect to the period of uncertainty, combining human resources, standing up a new agency that the full-service spectrum agency did. In fact, those issues might be somewhat greater since we're now talking about combining the entirety of NTIA and FCC.

We have observed that by putting it in the Executive Branch, there are certain constitutional issues that we have to think about from the perspective of insulating broadcast ownership and licensing decisions and certain FCC enforcement decisions from political interference.

We don't have any brilliant answers on that, but we have flagged that.

And we've also flagged whether or not this idea is consistent with the way the United States has approached its World -- WTO obligation with respect to an independent telecommunications

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regulator. While it's certainly independent from the service providers, which is sort of the fundamental point of the WTO commitment process, it would tend to combine all the telecommunication spectrum decision-making under an agency that ultimately answers to the president.

There's also some questions that we have about spectrum auctions which would now be outside of the purview of a Congressionally authorized FCC process and would be managed by this new Unity Agency under the Executive Branch. So there's a lot of conversations happening around the Unity Agency as well. Let's move on to the next slide, Jennifer. Jennifer is on mute.

MS. MANNER: There you are. There we go. So sorry.

MS. BROWN: So while those two ideas are pretty bold and pretty all-encompassing, a third idea for a new agency is a spectrum resource agency which would essentially be stood up as an agency with responsibility for simply top level spectrum governance and policy decisions. And the

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implementation of its decisions would flow down to the FCC and the NTIA. So you can think of this as these are the folks that control the table of allocation, whether sharing is feasible, top level decisions about our spectrum resources. And then it's up to the FCC and the NTIA to then execute on the decisions of the SRA.

So this is a much more slimmed down approach to a new agency in that pretty much the FCC and the NTIA, for the most part, continue in their current roles with their current authorized powers. Again, we're talking about this as an Executive Branch agency that would, again, be led by an administrator similar to the Unity Agency approach I just discussed.

Among the things that seems to feel right about this approach is as an Executive Branch agency, obviously, it's going to have to have some capacity for handling national security information about Department of Defense systems and spectrum needs, et cetera. So having it in the Executive Branch seems like a good fit from

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that perspective.

It does present questions about how decisions are handed off from this top level agency to the FCC and NTIA. And then how does the SRA decide whether its decisions have correctly been implemented below? There needs to be something of a feedback loop and a lot of interaction between these three agencies.

It does not save any resource because it's a new agency sort of layered on top of what we have. But on the other hand, it does get us to a place where spectrum resources can be decided.

Decisions can be made based on someone who is looking at the whole of government and the whole of the country, both national defense, commercial benefits, et cetera, et cetera. So it's the one place one can go to get an answer and have that answer come forth in a way that has taken all stakeholders into account -- hopefully in a way that has taken the views of all of the stakeholders into account.

So it's a little -- we've pressed a

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little on how the SRA would handle sharing decisions, and the conversation so far is they would handle a feasibility question. But the decision about sharing would then end up in the hands of the FCC or the NTIA. So the actual implementation would be handed off there.

We think the SRA would probably be doing research and development on sharing. That would indicate that they would be either themselves standing up lab resources or contracting with existing lab resources to sort of further the mechanisms by which spectrum could be shared. But again, that's just a function of the fact that there's a third agency now that would be involved in decision-making. And we have been talking a little bit too about, what are the parts of IRAC decision-making that needs to go up here versus what are the parts of IRAC decision-making that would remain in the NTIA?

So a lot of open issues on this. These are three very different proposals. Only the first one was one we brought forward clearly last time,

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and what we're trying to do is press on the benefits of each and the open issues on each to try to drill down as much as we can in the time we have.

We also have looked -- and Jennifer, you can switch to the next slide. We've also looked at, quote-unquote, new FCC as well as new NTIA, having the existing FCC take over all spectrum management responsibilities, leaving the NTIA in place in terms of executing on federal assignments and all the good work that they do, but having the FCC take over the decision-making function.

In writing the draft report, you sort of learn things as you try to write this stuff down.

This would be a significant change in the FCC and in our spectrum management and spectrum governance in the United States because we would have to infuse into the FCC new capabilities to handle national security and national defense issues. And so our draft report is sort of wrestling with that.

Also, it has felt awkward to some of us that decisions about defense spectrum would be in the hands of the FCC reporting to Congress as

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opposed to being in the hands of the Executive Branch reporting to the president. Again, there's no perfect answer to reform. So I think what we want to do is try to press ahead and present this idea as best we can, warts and all and benefits and all, and let folks just for themselves whether they think the FCC -- giving this function to the FCC is a good idea.

And then the next slide, the new NTIA.

Again, this is just the reverse, all spectrum management table of allocation decisions sitting in the NTIA. That's a little more comfortable because the NTIA already has the capacity to deal with the Department of Defense and law enforcement agencies in terms of national security issues. So that's a little bit different.

But it is also a significant expansion of their duties. We talked last time about probably elevating them, recommending an elevation in terms of where they sit inside the Department of Commerce structure. And also, we've talked a little bit about how -- with respect to FCC process

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where the commercial side is very used to a very highly transparent FCC notice and comment process, it would be nice import some of that way of doing business into this function at the NTIA, if the NTIA proposal goes forward.

And then if you would continue on, Jennifer, so I can wrap this up. These are the standalone options. The next one is research and development. And basically, as we have discussed each of the options that I've talked about, I think everybody had made the decision that there's some research and development function that should be added to whoever has the baton with respect to spectrum management and governance going forward, that there are R&D functions today that are not performed or performed in a pretty haphazard way.

By that, we mean that they are not directed to regulatory problems that the FCC and the NTIA are facing necessarily. There's no one -- if the FCC or the NTIA are seeing a problem that, gee, we wish we had a better propagation model, or gee, we wish we could develop this spectrum

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sharing mechanism more, there's no way for them to sort of directly do that. And so the idea is to give that enhanced R&D functionality with respect to refinements in modeling, sharing, gathering information about how technologies are evolving and ways in which they use spectrum, and, of course, all important, gathering information about demand and what's happening with demand so that they can project going forward how radio spectrum should change.

So I think the one constant you'll see here, although we put it at the end as a standalone, is this idea could probably be plugged into any of the options we've talked about before. And so with that, Jennifer, let me turn it over to you again to finish this off.

MS. MANNER: Sure. Thank you so much.

And someone is off of mute because I hear someone typing. So an additional one we talked about last time which really hasn't changed that much was the enhanced MOU between the FCC and NTIA. As folks may remember, there's a 2003 MOU which was done

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to expedite decisions and strengthen decision-making between NTIA and the FCC on spectrum issues.

This has not been updated in 17 years.

We recommend that it be updated going forward every two years. We also suggest that there be more specificity on how items are coordinated and there aren't delays. So I know we're running short on time, so I'm not going to spend a lot of time walking through this. But essentially, we can increase the process right now for items which the FCC and NTIA must coordinate on.

I did want to touch on some other options that we talked about. Just some things generally that came up was we actually believe the spectrum management process needs to be reviewed periodically by the government, and that needs -- no matter what option we choose, that's just something we should be doing as a good governance process.

And then there's a couple of things that we had identified in our discussions of steps that

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might improve the existing process if things don't change for a while or in the interim (audio interference) period. One was the idea of detailees from each agency to cross-pollinate the agencies helps communications to get a better understanding of people's process. We know there are some staff members now who do that, but it's not as much as perhaps it should be.

Also, and this is maybe a little late with the FCC moving. But now that they're delayed because of the pandemic, maybe this could happen, would be to co-locate the FCC and NTIA in the same office complex. It just makes for an easier coordination. And then the last idea is really in response and plans for having some sort of reorganization, and that's to put all the spectrum responsibilities for each agency into one bureau or office so that if there is a reorganization along the lines we recommended or something that we're not thinking of, at least they could be easily reorganized in ultimate structure.

So just to close on our next steps, I

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know everyone will miss us if we don't have a meeting regularly. So our next meeting is April 27 to determine on how we're going to finalize the report.

We've sent around the draft report to the working group and are waiting for comments there. But we're also going to want to give the full CSMAC members an opportunity to provide input.

So our real goal here now is to work towards finalizing the report for presentation. And I would be remiss before I turn the floor over for questions if I just didn't recognize the members of Mary's and my group and also our NTIA liaison, Chris Mattingly, who's been so helpful throughout this process. I think we've had a really great experience, Mary and I, working with all these folks, and we're very much looking forward to taking your questions and moving forward with finalizing the report. And with that, I'm going to stop sharing so the next person can put up their presentation, but we're happy to take questions.

CO-CHAIR WARREN: Jennifer, thank you very much, you and Mary, for that detailed look

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into each of the options being put on the table.

And as you said in the beginning, it's the range of the options. And I think, Mary, you said it's an opportunity to pull together a lot of ideas for later building blocks for others to think about and move on.

Before I ask you for questions, I just want to remind everybody to please use the queue and the chat box not for asking the questions but for indicating you have a question you want to ask and except for Donna who I think is still unable to access via audio. So if Donna does have a question, please, Donna, feel free to put that in the chat box and we will transmit that for you.

MS. MURPHY: Jennifer, I'm just testing. Can you hear me?

CO-CHAIR WARREN: Yes, excellent.

MS. MURPHY: Thank you to Mariam for the tip. I used her tip and then I logged out and back in. So just testing. Thank you.

CO-CHAIR RATH: Great, thanks.

MS. MANNER: Welcome. And if you have

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a question, you can go to the front of the line for persistence.

MS. MURPHY: Thank you. Thanks so much.

MS. MANNER: Just let me know. So anybody want to ask a question? I see a question. But, Dennis, would you like to ask your own question?

MR. ROBERSON: Yeah, sure. It's more of an observation than a question. But as I listen to the options, there are enough options that getting a sense to it of, to me, what hit was a 2x2 matrix, the value of the approach versus the doability, because it struck me. Some of the things are very valuable, but I don't know how we would ever do them. And those were some of the comments that you all made.

Some of them are maybe not quite as much value but are relatively easier to accomplish. They're not entangled with the legal challenges or just practical challenges. But somehow getting them into that kind of structure so that we could

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see them from that perspective I think would be really helpful, and there's probably more than just the doability versus value that if you could put them out that way. That would seem really helpful.

CO-CHAIR WARREN: This is Jennifer. Jennifer, Mary, just to add to that, it would seem that there would need to be other elements of that than just value and doability.

MR. ROBERSON: Absolutely. Yeah, I use it as an example.

CO-CHAIR WARREN: Yeah. I mean, it would be a fairly complicated, I think, plot. But is that something you feel that -- because it's really about a vision rather than -- it's a comparator rather than each being evaluated on their own. Anything that you want to take on?

MS. MANNER: Well, I would just say our first effort here is to try to ensure that we're clearly presenting each option, as I said, warts and all, the good and the bad, and that we're doing that in an evenhanded way. So if there are benefits associated with multiple options, we're drawing

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those out as well as if there are issues or concerns with multiple options, we're drawing those out equally. So that's sort of the first pass at our draft.

And then I think the question is up to the working group in terms of how far can we go to evaluate in any kind of a comparative sense what these options are. I agree that value and doability are two of the criteria you might use, but there are probably other criteria as well. Whether we can get there in the time we have, I don't know. It would certainly be a useful exercise, I think, if we could figure out what that chart looks like and then agree to it, yeah.

CO-CHAIR WARREN: Thank you. Maybe one of the approaches would be to phase it so that your working group works on finalizing the report.

And then if NTIA would find that useful, they could ask for the working group to then develop kind of an associated matrix based on --

MS. MANNER: Yeah.

CO-CHAIR WARREN: Right. But

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focusing first on the deliverable of that and then more of a qualitative, I think, that versus a matrix afterwards if that would --

(Simultaneous speaking.)

MS. MANNER: Right, okay, right. Other questions? I don't see anybody in the queue on the checked side. So all I can say is I know how often and serious all of the meetings have been on diligence. So thank you, guys, very much and all of the committee members for the work to date.

And I'm going to hand it over to Charla who has recovered from roll call as well as leading Subcommittee 2 as a co-chair.

CO-CHAIR RATH: Yeah, I figured nobody wanted to hear my voice for a while. Yeah, and thank you too. I'm seeing all the committees have been doing an incredible amount of work, and it's a big topic taken on by the first subcommittee. So next over to you, Mark, for what, of course, is just a little tiny question. But I think it's -- if you could run us through what the Subcommittee 2 on non-federal current and future

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spectrum requirements.

MR. GIBSON: Okay. Thanks, Charla. And I'd add my voice to what Jennifer and Mary have been doing. I was anticipating to some extent. But this question, I have been taking a lot of time as well.

PARTICIPANT: Can hardly hear you, Mark.

MR. GIBSON: I'm pretty excited.

CO-CHAIR RATH: Yeah, Mark. You're fading in and out.

MR. GIBSON: Okay. Stand by. Let me use earphones. Stand by just a second. Okay. Is that better?

CO-CHAIR RATH: Keep talking. I think it is. There's a little gray splotch in the middle of your subcommittee -- oh, there it goes. It's gone. Good. All right. Back to you.

MR. GIBSON: Okay, good. That should be a little better, I think. Okay. So yeah, this is the little question we've been working on. This is basically non-federal current and future

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spectrum requirements. And so this is our team.

Thanks to everybody who's participated. It's been very helpful to get the feedback we've had.

Here is the original question that we had. Basically, explore the feasibility of requesting this information, and this is basically the same content we put up last time.

CO-CHAIR RATH: Mark, can you speak up?

MR. GIBSON: Wow, okay. I can yell.

How's that? Is that better?

CO-CHAIR RATH: Just reflecting the chat room. Thank you.

MR. GIBSON: Okay. Got it from chat room. Okay, thanks. Okay. So what we did is we broke the question down into three tasks. And again, this is pretty consistent with what I presented last time.

So the first question, the first task was to explore the feasibility, utility requesting this information about current and future. We inverted them because the NTIA originally had future and current. But we figured

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we'd put current in front of future spectrum requirements from industry and non-federal users.

And considering the feasibility, try to identify what information would be already available, for example, looking at prior CSMAC reports and other recommendations. And then three, finally, recommend some approaches that could be taken to help find the spectrum requirements.

So we got started on this and just kind of ran -- as I mentioned before, ran into a little bit of headwind just because we needed some clarify on the question. So we met with the NTIA. Actually, I had a couple that were very helpful.

I think Bruce did a lot of this as well as the team. Wow, okay. I will speak louder. Let me just try something here. Bear with me.

CO-CHAIR RATH: If you have a headset, please take it off. That could be the problem.

MR. GIBSON: No, I got the headset on. I'll just keep yelling. Anyhow, stand by just a second. Okay. Anyhow, and just keep giving me

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comments in the chat room if you can't hear. Otherwise, I'll start shouting. So anyhow, what we did is we talked to NTIA and asked for a little bit of clarity on the question because we needed to figure out how to parse this thing down a little bit. And really, what did NTIA want to use with this information?

So the first thing we did was we -- the first thing they said was in terms of how they wanted to use the information was to just find out what's available for them to do a compatibility analysis between federal and non-federal systems. Often, when they look at bands to be shared, they have to do a compatibility study.

They also want to be able to anticipate needs for federal spectrum based on non-federal relevant use. So that's the second bullet. They want to compare with the data they're already collecting for federal agencies to see, for example, if there's more use in the industry as opposed to federal and see whether there is any consistency in changes of usage in between the

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commercial and federal sectors.

They're already going to compare the trends and whatnot and everything like that, and they're looking for a description of what data needs to be done. Basically, it's categorical, types of data that are out there. And then what data elements are needed to support greater sharing?

So after we got that, we went back and started looking at some additional questions that we had from our committee. For example, what data is needed? How will the data be used? What are the limitations -- and this is feedback we got also from NTIA. What are the limitations on the data in terms of costs, form, et cetera, actually this is from the committee.

We also talked about, what are the technology implications and advances that would drive data as well? So for example, one example is that -- and Charles mentioned this at the top of the call or the top of the meeting -- the 6 gig band. Opening up this 5925 to 7125 meg band was driven by changes in technology, primarily new

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wi-fi technology. So examples of that are here.

Another question is what authority does NTIA have to gather this data? Do they have authority or do they have to try to create that authority? And the other concern that we found is data on some of these commercial operations might be difficult to obtain just because some of this data is commercially sensitive. So what do we do about that? Can that data be collected under NTIA?

Are there other methods that could be used to collect this data?

Another consideration is there's many data sources out there, and there's a lot of work that needs to be done to collect that data and to analyze it. And so NTIA might want to focus on constraining the tasks, actually try to do dry testing and sampling, and how much of this is practical considering budgetary concerns as well as just the amount of data they're going to get.

So we were thinking that it may be worthwhile for NTIA to work with a third party. However, with the work that was being done in

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Subcommittee 1, we thought that -- and this is also a recommendation, part of the subcommittee on one of the charts -- was to look at the R&D agency and see if this new R&D agency could manage some of this.

NTIA has OSMA which is Ed Drocella and his team which are very busy and tons of things going on. And while those guys are excellent, they can only do so much. So this is a huge effort. So one thought might be if this blasts into this new vision that Subcommittee 1 has to stand this up under that R&D element. So that's basically some of the discussions we've had and what they've addressed.

And so my last slide here talks about the current work plan we have. So the first thing we did once we figured out what we were going to do was to look and define what are the services that the FCC has identified basically in the rule using FCC rule parts and defined them based really on the rule parts. So Part 22, Part 25, whatever, and any subparts as needed where there were services

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for whom spectrum is used or for those who use spectrum. And there's about 47 of those if you look at them. We put that all on a spreadsheet, actually the growing spreadsheet.

Then we also looked at each service.

And based on the expertise of people on the committee, we categorized each service as to whether it was growing, whether it was stable, or whether it was declining. Basically, this is in terms of spectrum needs, not in terms of any additional deployment. But those two are related.

And so those are the three categories.

And then so now what we're trying to do is identify whether data are available consistent with what we talked about earlier in terms of some of the data elements. So for example, are the data there available, for example, in ULS?

Did the data require more sort of AI type -- or maybe not AI, but data mining type of things where you can look at different data sources and then identify operations based on diversity of data and performance? So we're looking now at that.

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We're also looking at data sources through identified current and future usage. Those might be orthogonal insofar as the current usage may be well described in terms of what's already out there. But trying to determine future usage may be difficult just because of some of the constraints. And this is where you have a possible dry effect.

So that's the work plan. We expect to continue on this and have recommendations by the -- I think it's the July 10th meeting. We had so far the meetings you see up through April 13th.

We have another meeting May 8th, June 12th, and July 10th, and we were hopeful to have at least draft recommendations and a report by July 2020.

So with that, I'll pause and ask Bob or any other committee members if they want to add anything to this.

MR. WELLER: This is Bob. I don't have anything to add. Nice summary.

CO-CHAIR RATH: Yeah, and I don't see anybody in line to ask you a question, but this

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is the time if any members want to ask questions.

Or NTIA, if you have anything to add, let us know.

I think that may be it. So if there's no questions for you all, just making sure. Going once, going twice.

So onto the next subcommittee then, Subcommittee 3 with the IPDR. And if I remember correctly, you guys tell me, is it Mariam who's going first, or is Bryan going to start? It looks like, Mariam, you are.

MR. TRAMONT: Yeah, we're going to both -- my understanding is we're both going to be open, and she's going to do the slides. But we're both going to talk.

MS. SOROND: Correct. So just testing, can you all hear me?

CO-CHAIR RATH: Yep, and I can see the slides.

MS. SOROND: Okay. Okay, perfect, everyone. So this is a report on IPDR, Subcommittee 3. This slide lists our subcommittee members. Thank you to all who've participated and

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contributed and, of course, Bruce, our NTIA liaison. So I wanted to really have a shout out to everyone.

Our NTIA question is posted here. Again, how could the NTIA's and the FCC's equipment authorization rules be modified to require that all transmitters use a unique identifier? And the second part of this question was, what are the barriers to doing so?

So basically, just a status update. I think when we started, there was a decision that was made that we do a literature review first on this to see what's out there in September. And then we turned around and in December shared that and circulated it to the subcommittee and solicited feedback.

I think post the CSMAC call, we also decided that we need to kind of propose a draft outline for the actual subcommittee report, and we presented that also in December and tried to get volunteers for it. And also, the other effort that was underway was to seek out expertise outside

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with respect to interference or interference hunting that is going out there that can give us more insight. So that also happened.

We had a subcommittee call on February 25th, and we also invited one of the experts to the call with the subcommittee to review the information. And after that, we worked on gathering the data in the report. So that's where we are with the status.

And the preliminary recommendations on some of these we've also in the last report highlighted is that there's definitely a path for modifying the FCC's and NTIA's equipment, and that is a very straightforward path. In either of the case of whether we look at this from a band-by-band, use case by use case specific scenario, or we look at it as more broadly a change that requires all equipment to have unique identifiers.

So there's definitely a path for -- the administrative path is there. And also, we definitely know that there are likely specific bands or use cases where a unique identifier could

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be a viable tool. But we also concluded is that if we want to look at a requirement on a ubiquitous basis that applies to every transmitter, that would be extremely complex. So therefore, we actually have a recommendation that says we should approach this question through a band-by-band or use case approach due to the challenges of the ubiquitous basis. Go ahead, Bryan.

MR. TRAMONT: Yeah. So actually, we should reference this. But also in your materials, you have a 15-page draft of our final report. Our goal is to have that adopted in August or the next meeting. The slide summarized the contents of that report. So to the extent you have thoughts, we'd love to have those channeled towards edits or towards additional things to be added to the report.

In the draft, you'll notice that one of the things we tried to do is parse through a number of times where the FCC has imposed a unique identifier obligation on a licensee, and we try to draw out what the rationale for doing so was or the rationale for rejecting a unique identifier.

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These, well, mostly come across as pretty common sense where folks are operating on a shared channel. Therefore, there's a risk of interference.

If you need to know the source, they are more likely to require identifiers. When it's a critical infrastructure or government user where protections are particularly important to tracing, detection, resolution, and interference is particularly important, they're more likely to do so.

In contrast, where it's pretty easy to identify the user because of the nature of the underlying service, they're not likely to require identifiers. Where identifying the signal, definition signal is particularly helpful in tracing once, again, a place where they would not do it. Where there aren't industry standards or the industry has not rallied around the idea of developing one or the importance of interference detection, they're not likely to do so. When it would hinder a new technology or an ecosystem, not likely to do so. And finally, where regulatory

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policy makes the occurrence of interference less likely relative to other bands.

So just kind of a catalog of different rationales that have been used by the Agency. They are summarized in Slide 7 with the two gating criteria that policymakers are generally utilizing when deciding whether or not a band is a good candidate for unique identifiers, how often will or does harmful interference occur, and how difficult will it be to identify and remedy.

Also somewhat implicit in this, it's common that we go back and look at bands that are already in extensive use and then impose unique identifier requirement. Far more often, it's at the outset at a launch of a service and a band that such obligation will be raised. And then the second bullet here on Slide 7, the more often interference occurs, the harder it is to remediate, the stronger the case to explore.

I think the committee and the report reflects a balance between the merits of a unique identifier approach in certain situations, and I

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think a fairly widely held resistance to the idea that it's to be applied in every band and every situation. So narrowing the pool of bands where unique identifier policies are well founded has been the main goal of the group.

One thing that we have lacked candidly is strong advocates for unique identifiers in particular band situations where they can walk us through some of the rationales. We've heard a fair amount from skeptics and we've heard from some folks backwards looking to places where it's been applied. But it'd be great if you can point us in the direction of additional folks to interview on either side of the equation, particularly if they have a strong use case point of view, that'd be great to add that perspective to what we've drafted.

Under the barriers to unique identifiers, Slide 8, standards development, particularly the device, particularly power levels, things of that nature. Privacy and security concerns and innovation and investment,

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all things that were sort of alluded to in the FCC's public decisions on the use of unique identifiers.

We sort of pulled them out. In addition for this, there's a unique identifier section which was called for in the initial question.

So as I mentioned, we're going to finalize the draft report and be ready to go at the next meeting. We welcome edits, and we would welcome experts or resources that we can use to supplement the report from any one of those. And with that, Mariam, anything else I missed?

MS. SOROND: No, I think that was great. So definitely, we'd like to open it up to questions.

CO-CHAIR RATH: It looks like Michael Calabrese would like --

(Simultaneous speaking.)

CO-CHAIR RATH: Hi, this is Michael. Yeah, this looks like a way to -- framework for thinking about this. I haven't read the draft report, but --

CO-CHAIR RATH: Michael?

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MR. TRAMONT: Yeah, we lost you.

CO-CHAIR RATH: We lost you. It looks like Michael is still connected. So yeah, why don't you type in your question? Mariam just asked you to, if you can hear us, Michael.

CO-CHAIR WARREN: Hey, Charla.

CO-CHAIR RATH: Yeah?

CO-CHAIR WARREN: While we're waiting for Michael to type his question, can I ask a question?

(Laughter.)

CO-CHAIR RATH: Having heard nothing from Michael objecting otherwise, yeah, why don't you go ahead and do that.

CO-CHAIR WARREN: As soon as Michael types his question --

(Simultaneous speaking.)

CO-CHAIR RATH: Oh, it looks like he may be coming in separately.

MR. CALABRESE: Can you hear me again?

CO-CHAIR RATH: Yeah.

CO-CHAIR WARREN: Oh, here we go.

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CO-CHAIR RATH: Great.

CO-CHAIR WARREN: Back to Michael.

MR. CALABRESE: Yeah, I'm sorry. The whole thing just dropped for me. Anyway --

CO-CHAIR RATH: Fast getting back in, though, Michael. Good job.

MR. CALABRESE: Thanks. The question is whether -- you are discussing whether -- would there be a point to this, or would there be any purpose if the device is not transmitting its accurate location, because the two seem tied together in practical terms. And I'm wondering if that's explicitly discussed because that probably raises questions of both feasibility, privacy, et cetera, in a more explicit way than just thinking about a particular use case.

MR. TRAMONT: That's an interesting point. I don't think we -- I think you're right.

A lot of the analysis in the draft report assumes the two things are one. That is to say that the unique identifier is also associated with the specific geographic location and therefore

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implicates privacy and the other things you described.

It's probably worth -- and I'd love your thoughts or edits on this. If there is a role for unique identifiers independent of geographic location, I can imagine if devices were all affiliated with a certain carrier or a university or what have you and having a way in which you know at least who is responsible for the device might be useful, even if you don't know exactly where it is could be interesting. But I think that's a good point. It'd be interesting to have a conversation about that and acknowledge that in the draft.

MS. SOROND: I think the assumption we had was that basically if you are trying to identify an interference source, right, I mean, you're seeing it and you are as the victim of that, that's defining the area of the location. Does that make sense? So basically, therefore, what you would need is a note to whatever, assuming there's a unique identifier and you know it's an operation

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of text saying that I see interference. And then it is up to the next steps on what is the resolution obviously, the R of the IPDR.

But that was the underlying assumption, I think, that we made over here because it is very complex to kind of assume that every device therefore needs to have GPS. It would turn into a lot of very additional requirements that would make it a lot more challenging.

MR. CALABRESE: Right. So it seems worthwhile to think through or at least flag kind of the practical use of this absent that. And Bryan had a good example is you know the area where the interference is occurring, so perhaps you contact the licensees and say, is this one of your devices, for example.

CO-CHAIR RATH: Any other thoughts on Michael's question before we move on to Jennifer, from the committee, I mean? Jennifer, you're next.

CO-CHAIR WARREN: Yeah, thank you. So this was really interesting. This is one of the groups that I participated in. Well, there's

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reference to IPDR experts that you made. And I know, Bryan, you said there was the draft report.

Does the draft report list the experts that you have consulted, and can you talk a little bit about the range of the background of those experts? Do they come from comms, non-comms, different types of users of spectrum? Can you share that?

MR. TRAMONT: Yes. So perhaps we were over-grandiose in our reference to experts, per se. Most of the folks, we did a fair amount of this work ourselves and in addition relied a lot on members of the CSMAC in conversations. We did -- the person we've interviewed -- we talked -- well, the FCC declined to participate.

We have had conversations with NTIA, and then we also -- thanks to Dale, Jay Jacobsmeyer, who is an interference hunter in the west, also talked to us. So we've had a limited number of interviews.

CO-CHAIR WARREN: Okay. But did I understand you correctly that you're planning on more, or --

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MR. TRAMONT: We would welcome an opportunity to talk to more people to walk through what the various factors of this are. There has been --

(Simultaneous speaking.)

MR. TRAMONT: -- short of a rush to the microphone on this topic, I must say.

CO-CHAIR RATH: Any follow-on, Jennifer, to that, or --

CO-CHAIR WARREN: Thank you very much. Appreciate it.

CO-CHAIR RATH: Yeah. Anyhow, it looks like -- relying on the chat function, it looks like we have no additional questions on this report.

So Jennifer, over to you for the last subcommittee.

CO-CHAIR WARREN: Thank you. So we are moving to Subcommittee 4 which started later than everybody else but not late. It intentionally started in January after the World Radio Conference. So Andrew and Carolyn will present to us a report on the work on the UAS question that they are sharing. Andrew? Carolyn? Are you guys

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there?

MR. ROY: This is Andy. I'm here, but Carolyn is going to be the one who starts this. So I'm just waiting to see if she comes on.

CO-CHAIR WARREN: Carolyn, you're on mute.

MS. KAHN: There you go. Can you hear me now?

CO-CHAIR WARREN: There we go. There we go.

MS. KAHN: Okay, great.

(Simultaneous speaking.)

MS. KAHN: Okay, sure. So yes. So we had a staggered start as was just mentioned, kicking off our work in January. So I'm happy to provide an update, and we'd like to thank all of our subcommittee members who contributed to this work and also Dave Reed who coordinated with us from NTIA. So this is our question from NTIA which is focused on integrating safely UAS into the national airspace. It includes all classifications of UAS.

CO-CHAIR WARREN: Carolyn, you're

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fading. Carolyn?

MS. KAHN: Yes. Can you hear me okay now?

CO-CHAIR RATH: I can hear you fine, Jennifer. Does anyone else have a problem with hearing?

PARTICIPANT: She's fine here.

CO-CHAIR RATH: Yeah.

PARTICIPANT: Yeah, she's fine with me too.

CO-CHAIR WARREN: Okay. She was fading in and out on my end, then it's my connection. All right.

MS. KAHN: Okay. So this is our question. Our work is focused on spectrum to support command and control C2 operations, or in other words, control and non-payload communications, the CNPC link, again, we're looking across all classifications of UAS focused on spectrum options, potential solutions, and focusing on questions about what an appropriate model would be for spectrum access as well as

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important governance characteristics, if there are any liability issues, and if there's a need to create an entity to facilitate collaboration across the different UAS federal advisory committees, and if so, how that could be structured.

There's a lot of work going on in the community for UAS which is great. And so we want to provide complimentary value add to those other activities going on. And so we'll be discussing today how we're approaching this work and our initial observations for it.

So again, we kicked off in January. We've had several subcommittee meetings focused on scoping and planning our work, developing a framework and structure for the information, gathering inputs, and coming together to provide a status update. We are working to schedule interviews to gather additional information which includes the FAA, the Drone Advisory Committee there to learn more about their specific activities. And we scheduled a meeting with representatives of the FCC Technical Advisory

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Council next week. We really appreciate that opportunity to learn more about the TAC's work and their perspectives on spectrum for UAS CNPC.

So our subcommittee decided to take a two-prong approach to address the question. First is to look at what's going on broadly, the different UAS activities, and to kind of get a lay of the land, so to gather this information, what everyone is doing, the work in this area. To do this, we're gathering input from the subcommittee which highlights activities in different areas and different organizations. And then the interviews we're conducting will be to gather additional information and details about the work that's going on.

At the same time, we're working to identify a way ahead for UAS spectrum access in C-band, specifically the 5030 to 5091 megahertz spectrum band, and looking at potential spectrum access mechanisms, evaluating them in terms of their pros/cons and priorities. So Andy, I'll turn it over to you to provide more of an update in both

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of those areas.

MR. ROY: Great. Thanks, Carolyn. And hopefully, everyone can hear me okay. So for those of you familiar with the UAS development as it's a fairly new technology, there's a lot of concurrent activity in different areas. As you saw from the NTIA question, looking at the different federal advisory boards and what support those.

So the two main ones initially focused on were the FAA Drone Advisory Committee and the FCC Technical Advisory Council. Both the -- sorry, excuse me -- the FAA is active at the moment, and the FCC worked on it in the last cycle. So refreshing their memory and as Carolyn said, got interviews being lined up with TAC at the moment.

And also the FAA, we're in discussions with as well to speak to their membership and understand where they're at.

One of the other groups we're also trying to reach out now as well is RTCA. It's a communications standards organization. It was an advisory board last year to the FAA. It's now lost

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that status, but they're still working on the original FAA tasking on UAS standards development.

So we're also reaching out to them to see if we can arrange to have a discussion with them.

There are many, many, many other groups involved as well in the UAS activities. ICAO has done a lot of work, the International Civil Aviation Organization dealing with the international standardization of it. And we've got several panels looking at spectrum and operational components. Obviously, NASA has been fairly active in the UAS Traffic Management Pilot program.

3GPP is developing UAS standards as well in Release 17 and Release 18 and onwards. There's also an interagency EXCOM working with UAS components and information needed between the different federal agencies. And there is also the Section 374 of FAA Reauthorization Act of 2018 where the FAA, FCC, and NTIA started working on a response to Congress on UAS spectrum.

In addition to that, there are multiple industry areas and groups working on things. So

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we're really trying to get a handle on those and seeing once we get beyond the initial advisory boards and committees, who else we want to reach out to and have a discussion to get the necessary information. Next slide, please.

So first, we're starting to use with the advisory boards. The ones that formed the advisory boards are the first three there. The TAC is already organized and DAC and hopefully SC 228 we could follow quickly as well. The three areas we're going to focus on with those entities, firstly, discussing their advisory board functions and activities, what they're doing, what their objectives are, and areas where they think they need to look at as well.

We're also going to discuss -- and this is where the acronym CNPC, command non-payload communications development or command and control for certain elements. I'll come back to that in a moment. Looking at what is being done on that to get a better understanding of what their spectrum requirements are of such communication links.

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And then lastly, looking at what spectrum considerations those committees have been dealing with. Some of have looked at spectrum significantly. Others haven't touched it as much as others. We're going to drill down where we can and find out what is being done. Next slide, please.

So in developing that information from the different committees, one thing we've done is develop a monster of a spreadsheet, once we start filling it out, to really have everything in one place for all the different areas. So for each of those different working organizations, we're trying to build a picture of their environment, so definitions, dealing with how they're building it, the different complexities, what models they considered, classes of systems, standards, and so forth.

We're also considering for CNPC functions as well because there are slightly different definitions. Again, I will cover that in a moment. I want to make sure we're being clear

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on what we're working on at the same time.

Spectrum options, there's a large variation of operational requirements and parameters for UAS. So spectrum is probably the single solution in terms of the band technology, and then the spectrum access models as well, what they have considered or not considered. So frequency access, governance and ownership, and any other requirements under the NTIA question given to the subcommittee. Next slide, please.

So this is just one of the examples.

So definitions of UAS, command non-payload communications, and C2. As you can see here from the five different entities that we've been investigating at the moment, there are a slightly different way of defining this and naming it, the ITU-R and CNPC as well as the FCC and also RTCA.

However, ICAO and the FAA tend to defer more to the C2 elements. Again, this is under development, though. The FAA was clear in some of their work previously that it's still developing technology and they're still working on exactly

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how to define it more appropriately. But as it stands, this is what they have.

So things we're trying to pull together. I would say the group has not agreed to have a specific definition they're going to stick to. It's a disagreement just because they want to get more information first from the different advisory boards and committees and see where that takes us. Next slide, please.

So one of the things, obviously you can tell there's a rather wide ranging element of information gathered. And so while that is ongoing, one of the other aspects is how do we more immediately address megahertz and multiple allocations signed in U.S. and also internationally as well.

So several different access models were being considered, and we basically asked the committee to submit proposals or concepts debated amongst ourselves. And we're looking at third party coordinators, both single or multiple coordinators, potential sharing techniques, sense

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and avoid or unlicensed, and even band partitioning as well. Still waiting for details on several of those yet, but we are seeking more input as we go.

One of the things that's come up, and it's pretty key to this is the approach is kind of varied depending on the UAS classification or requirements. The group has been fairly clear that there is not a one stop shop as it were for UAS spectrum access models or technology. It's a very large variation in mission profiles, UAS sizes, ranges, operations, and users. So we do think it's not going to be a single solution but probably multiple solutions that may be proposed by the end as options to NTIA. Next slide, please.

And these are just some of the considerations that affects that. So safety-of-life and safety-of-flight obviously has an overarching implication and overhead that needs to be accounted for in what's going on. Different altitudes for low level, obvious level, all the way up to integrating fleet with manned aviation in controlled airspace. Mission types,

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operational types, sizes of big matter and that's obviously what's currently defined FAA, so below 55 pounds.

Different communication needs, and then scaling that problem as well if UAS technology continues to grow and how that integrates into the current environment. And then lastly, position, navigation, and timing requirements as well, all of the possible factors and considerations we need to look at. So rather a large topic to get our heads around. Next slide. And I think it's over to Carolyn now.

MS. KAHN: Okay, great. Thanks, Andy.

So as Andy said, some initial observations. First, spectrum needs vary based on the complexity of the UAS use cases, based on the size of UAS systems. And so there are many different types of UAS in mission. And so there's no single solution that's applicable to all. So that goes into the complexity issue.

But CNPC and C2 spectrum, access is critical for safety and enabling safe integration

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of UAS into the National Air Space. Also, NTIA and FCC as regulators of spectrum need to be informed of the various spectrum requirements for UAS. And so this rule does require coordination and integration across different organizations and activities, and because there are so many activities and organizations involved, U.S. leadership is important to provide a direction and way ahead to help bring convergence and a focused path forward.

At the same time, there is a need to establish access granting mechanisms and service rules, such as to move out on C-band and other spectrum. And so there is a dichotomy of should this be a market and flexible type of approach or something that's more rules and prescriptive based.

But the access granting mechanism and service rules are needed to move out on integrating UAS services quickly.

So our next steps is to conduct interviews to gather additional information, continue to get input from the subcommittee. And

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again, we're looking at federal advisory committees, standards organizations, and other activities going on, analyzing the information, iterating on it, perhaps conducting follow-on interviews and other follow-on work. And then we'll be delivering a report and recommendations to NTIA in March of next year. So that concludes our slides, and we're happy to open it up to comments and discussion.

CO-CHAIR WARREN: Carolyn, Andy, thank you very much. You all have such a broad scope in terms of range of things to look at to take into account. You're doing a great job, though. Thank you very much for the work to date and the work ahead of you. I'm looking to see if there are any questions in the queue, and I think Dale has one.

Dale, did you want to ask your question, or would you like me to ask it?

MR. HATFIELD: Well, either way.

CO-CHAIR WARREN: I wasn't sure if you had audio challenges. But please, go ahead.

MR. HATFIELD: I'm asking my usual

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question is that if all this works okay but there's still some bad actors out there and so forth, what steps do you think need to be taken in terms of enforcement when you've got mixed jurisdiction here between the FCC and NTIA on some of the spectrum and the FAA, of course, isn't part of it? So I'd just be curious about what your thoughts were.

MS. KAHN: Yeah. So I mean, I can say safety is critical, and so that all needs to be worked out a priori. And the spectrum is critical to that to ensure safety of operations. So that's a good point that we can discuss more in our subcommittee.

CO-CHAIR WARREN: Carolyn, this is Jennifer. Would you say that will be part of the deliberations in the approaches that you and Andy had listed there in terms of coordinators and methods of accessing the spectrum?

MS. KAHN: Yes.

CO-CHAIR WARREN: Okay. Thank you, Dale. Any other questions?

(No audible response.)

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CO-CHAIR WARREN: No. So I think with that, we are going to -- we are really quite on time despite the little learning curve we had at the beginning of this -- of our session today. Hopefully it's the only time we'll have to not meet together and do this virtually, but as Charla and I were noting, a good trial run in case we do.

So this would be the time that we would open it up for public comment, and Charla and I are dependent upon Antonio and Dave for helping us making sure the lines are open for those who want to speak. But if you do want to speak, please let us know and we will form a queue. Just giving everybody a second to go off mute in case there's someone on mute, but I don't hear any request for the floor. Okay.

Apparently, we have answered everybody's questions through the great reports that all the committees did. So thank you very much. Charla, shall I turn it over to you for closing remarks?

CO-CHAIR RATH: I can. I'm more than

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happy to start out. First things first, I really appreciate everyone's patience earlier in dealing with what is sort of a difficult way to manage this kind of meeting, and it's something we're so used to doing it live. So I really appreciate that. And also, thanks to NTIA for all the work that they've been doing to make this seem and feel like we're just operating under normal conditions, and I realize for everyone this is far from being normal. So again, thanks.

And especially thanks, again, as I said earlier, I was reviewing all of the materials and just looking at all the work that people have done.

We have several just tricky questions in front of us and really appreciate just how much people have been participating. And particularly, thank you to the co-chairs for being so persistent and for the NTIA staff who has been great at supporting our effort. So that over to you, Jennifer. I really don't have anything else to say besides that.

CO-CHAIR WARREN: Sure. So obviously, as you all know, we had talked about

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the next meeting being in conjunction with the ISART meeting in Colorado. We are working with NTIA to understand whether that -- as time goes on, whether or not that appears to be feasible, whether what mood we'll be in. So we will keep you all apprised of that.

At the next meeting, we'll obviously have a suite of recommendations for the CSMAC to consider and adopt. So it'll be an action-oriented meeting, and I think that's it. Just want to thank everybody. And does NTIA have any closing remarks that it would want to offer? Or if not, we will just adjourn. Dave?

MR. REED: Thanks, Jennifer. No, I think we've covered it. The next meeting is a little bit up in the air, see if it works out. Thank you.

CO-CHAIR WARREN: Okay. Thank you. Jennifer?

CO-CHAIR RATH: Wait one second. I think somebody -- did we -- is that you, Trisha?

MS. PAOLETTA: Yes, may I have the

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floor? Is the public able to comment?

CO-CHAIR RATH: Yeah, we didn't close the meeting yet. So okay.

MS. PAOLETTA: Okay. I appreciate that. I'm speaking in my position as counsel for 5G Americas, and we had sent a letter to NTIA and Charles and his colleagues earlier this month. And we had asked that the CSMAC and NTIA consider looking at the 3 gigahertz band in a little more depth through CSMAC. Obviously, we're very appreciative of the work they've done in the upper 100 megahertz but wanted to focus more closely on the rest of the band, 3100 to 3450 as well.

So I was interested if there's any response to that proposal, and it sounds from the work you are already doing that perhaps some of it could be perhaps addressed in the second subcommittee on non-federal spectrum requirements.

So I'm looking for any response that members of CSMAC might have. Thank you.

MR. POVELITES: Charla?

CO-CHAIR RATH: Trisha, this is

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Charla. Two things I'm wondering. Are you looking for a response from CSMAC, or are you looking for a response from NTIA?

MS. PAOLETTA: CSMAC, I suppose. Particularly, maybe the co-chairs of the second subcommittee, the non-federal current and future spectrum requirements.

CO-CHAIR RATH: Yeah. No, I think in general we would actually have to just take it under consideration. But obviously, if there are other comments that somebody would like to make, I certainly will do nothing to prevent that. So see that anybody -- hang on a second. I just want to make sure. It looks like Carl -- actually, Audrey asked about the dates of the ISART which Audrey will deal with that at the end again. But Carl, it looks like you've raised your hand.

MR. POVELITES: This is Carl Povelites. I think that's a good idea to ask NTIA if they would consider doing that, something similar to AWS-3. That process was challenging, but it provided a lot of trust amongst those who

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were participating.

My understanding is there are a number of other entities that may be deciding to look at the band and some sharing capabilities, and I think that NTIA is a good place for this to be held and CSMAC may be of benefit. So just ask them and it'll be considered.

MR. SHARKEY: And Charla, this is Steve Sharkey. I want to support what Carl says. I mean, it would be a good thing to look at if there's potential to help with the review of that band. I do think the AWS-3 work helped both sides to understand the challenges and opportunities of accessing that spectrum and end up with a pretty successful outcome, and it would be a worthwhile thing to consider here.

MR. GIBSON: Again, this is Mark. I'll add my voice to that as well. Those of us who went through that, although it was painstaking, it was fruitful. So to the extent that we could do that again with this band, we might be able to have some success.

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MS. BROWN: And this is Mary Brown. I just wanted to say I wasn't on the CSMAC when the AWS stuff was done, but I've talked to many of the people here and others who did participate.

And I heard nothing but good things about CSMAC's ability to contribute to those difficult issues.

So we're thinking about the lower part, thanks.

CO-CHAIR WARREN: Anyone else if you want to comment, let me know in chat. But I thought, NTIA, do you have any thoughts about this?

That would be Charles hopefully or Dave.

MR. COOPER: Hello, I was trying to find my unmute button. This is Charles from NTIA.

So first of all, the spectrum Americas letter, thank you so much for sending that letter to us and providing some suggestions to us, particularly on the spectrum parts -- the spectrum sharing parts of the letter. We found those very interesting.

To the overall question dealing with the establishment of a working group, that was before my time with AWS-3 that was pointed to. Looking back, AWS-3 was back in the 2012-2013 time

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frame where CSMAC started five working groups comprised of even our members, both federal agencies and in industry. And I think there were, like, a total of five working groups that worked their way through the bands.

And the reason why that was critical for CSMAC and NTIA was those bands had and continue to have a federal encumbrance, either it would have to be shared with or the federal encumbrance would have be relocated. And as Doug Kinkoph mentioned in the introductory remarks as well, AWS-3 continues to be a topic of conversation with the FCC in coordination with NTIA issuing the STAs to permit more widespread use of that AWS-3 spectrum.

So that's certainly been a success thus far. So with regards to the question, though, on the establishment of a working group, yeah, I think we hear you and NTIA will take that under advisement. So thank you so much for that.

CO-CHAIR WARREN: Okay. I'd like to also point out we had one quick question from the public also on the chat page, and this would be

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to -- I'm going to address it to Andy and Carolyn.

I'm not sure if you can see it. It asked if the working group is considering consolidating all UAS into the 5030-5091 megahertz band, including DoD.

MS. KAHN: Yeah, so we're looking at spectrum broadly and spectrum for CNPC, and the C-band, the 5030 to 5091 is one way ahead. So we're looking at that case, but we're also looking at spectrum broadly.

CO-CHAIR WARREN: Thank you, Carolyn.

MR. ROY: And I'll just follow up. So the reason why we picked on C-band specifically is because it's a band that's available for UAS and has an allocation and there is active involvement on developing technologies for it. So we started with that as an example, develop ideas on what could be done for spectrum access mechanisms.

But as Carolyn said, we're broadly looking at all other options as well. But it was just as a way of this band is looking like it's coming online soon, so let's look at that in the

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short term. And other bands we can look at using that experience to develop as well.

CO-CHAIR WARREN: Okay. Thank you very much. So since we had actually closed -- well, we're now going back to our closing remarks recognizing that there might've been some technology glitches and people figuring out how to ask questions in the public comment section. But we're going back to closing remarks, and I don't see any further questions anyway.

We've accommodated all of the public lines, and we will keep you up to date on the date and time for our next meeting. But clearly, work is underway on all the spectrum CSMAC subcommittees, so thank you. And I think with that, we're adjourned.

(Whereupon, the above-entitled matter went off the record at 3:24 p.m.)

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