

UNITED STATES DEPARTMENT OF COMMERCE
NATIONAL TELECOMMUNICATIONS AND INFORMATION
ADMINISTRATION

COMMERCE SPECTRUM MANAGEMENT ADVISORY COMMITTEE
(CSMAC) MEETING

Washington, D.C.

Friday, March 10, 2023

- 1 PARTICIPANTS:
- 2 JENNIFER ALVAREZ
- 3 REZA AREFI
- 4 DONNA BETHEA-MURPHY
- 5 HILARY CAIN
- 6 MICHAEL CALABRESE
- 7 CHARLES COOPER
- 8 THOMAS DOMBROWSKY, JR.
- 9 MARK GIBSON
- 10 SCOTT HARRIS
- 11 DALE HATFIELD
- 12 CAROLYN KAHN
- 13 JENNIFER MANNER
- 14 PAUL MARGIE
- 15 JENNIFER MCCARTHY
- 16 KARL NEBBIA
- 17 LOUIS PERAERTZ
- 18 DANIELLE PIÑERES
- 19 CHARLA RATH
- 20 GLENN REYNOLDS
- 21 ANTONIO RICHARDSON
- 22 DENNIS ROBERSON

1 PARTICIPANTS (CONT'D) :

2 ANDREW ROY

3 STEVE SHARKEY

4 MARIAM SOROND

5 BRYAN TRAMONT

6 ROBERT WELLER

7 DAVID WRIGHT

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

2 (10:01 a.m.)

3 MR. RICHARDSON: In that case, we can go
4 in on and get started here. So good morning,
5 everyone, and welcome to the Commerce Spectrum
6 Management Advisory Committee Meeting. My name is
7 Antonio Richardson, and I am the designated
8 Federal officer for this committee. I would like
9 to put out a couple of housekeeping notes. One,
10 please keep your microphones or phones muted if
11 you're not talking. And the second one is this
12 meeting is being recorded to assist in drafting
13 the summary minutes and attendees volunteer
14 participation in the meeting demonstrates consent
15 to this recordings. And now I will turn this over
16 to Mr. Charles Cooper, the associate administrator
17 of The Office of Spectrum Management here at NTIA.
18 Mr. Cooper?

19 MR. COOPER: Thank you, Antonio, and
20 welcome everyone. Appreciate everyone's time. As
21 we continue this very important CSMAC meeting
22 series. We'll be getting started with turning it

1 over to the co-chairs momentarily but I'd first
2 like to introduce Mr. Scott Harris, Senior
3 Spectrum Advisory for NTIA, for opening remarks.
4 Scott, the floor is yours. And I think you're on
5 mute, Scott.

6 MR. HARRIS: If I don't screw up the
7 mute thing at least once per meeting, you know.
8 Look, it's great to see you all again. Before we
9 turn to all of the work and the great work that
10 you've been doing, I wanted to take a moment, if
11 you didn't mind, to talk about some of what we've
12 been doing.

13 Specifically, I'd like to talk about the
14 National Spectrum Strategy that Alan and I have
15 been talking about publicly so often. Despite all
16 indications to the contrary, we are actually close
17 to kicking off the process. We have a draft
18 request for comments that we are very close to
19 releasing. We have made a tactical decision, as
20 you will see shortly, to be broad, rather ask
21 broad questions rather than specific questions.
22 But we expect we will receive, actually, rather

1 specific answers. And if that seems to make no
2 sense, let me know whether it makes more sense
3 when you see the document.

4 I might also add, it is our goal in this
5 process to figure out a path to more intensive
6 spectrum use for federal missions as well as for
7 the private sector. We hope the questions we
8 asked will reflect our interest in carrying out
9 this endeavor with both federal and private sector
10 concerns in mind. We'll also be holding two
11 public listening sessions in connection with the
12 RFC. One will be in DC, one will not. And of
13 course, we'll be meeting with the federal agencies
14 because they are going to be deeply involved in
15 this process. Precise details on all of this will
16 be public very soon.

17 Looking at your work, and at today's
18 agenda, I want to add that this work seems, to me
19 at least, to be particularly timely. And I think
20 a lot of it, if not all of it, is going to inform
21 our development of the spectrum strategy. For
22 example, the review of 6G use cases and spectrum

1 needs is directly responsive.

2 In any case, the review of the 6G use
3 cases and spectrum needs is directly responsive to
4 some of the questions in our --

5 COMPUTER AUDIO INTERRUPTION: The
6 conference is now in silent mode.

7 MR. RICHARDSON: I'm sorry, Scott, I
8 needed to mute the public out there. Go ahead.

9 MR. HARRIS: That's okay. And the work
10 on electromagnetic compatibility improvements
11 involving aeronautical radars and commercial
12 wireless networks is also directly relevant to
13 another set of questions. The same seems to be
14 true on the work done on ultrawide band. So, I
15 guess it's more than coincidence that the
16 questions we've asked you guys relate pretty
17 directly to our thinking about a Spectrum
18 strategy, but it is, regardless, pretty
19 convenient. So, I'm looking forward to hearing
20 from our subcommittees, reading the reports, and
21 getting your recommendations. Having said all
22 that, before I turn it over to co-chairs, if

1 anyone has any questions, I'm happy to take them,
2 and then I'll turn it over to folks. Okay.

3 MR. NEBBIA: I'm sorry, Scott. This is
4 Karl Nebbia. Just was interested as you look
5 forward toward the National Spectrum Strategy, is
6 what kind of buy in you're looking for from the
7 commission?

8 MR. HARRIS: We are going to do this in
9 collaboration with the commission. We expect them
10 to be working with us very closely from the
11 beginning of the process to the end of the
12 process.

13 And Carl, you'll know the kind of work
14 we'll be doing with the federal agency, so we
15 expect the executive branch agencies and the
16 commission to be working with us all the way
17 through. We view this as a collaborative effort.
18 And truth is, to be successful, it's got to be a
19 collaborative effort, right?

20 Other questions? God, I don't usually
21 stun this group into silence. I think I'm very
22 happy with that. Just say it.

1 MS. RATH: All right. Well --

2 MR. HARRIS: With that, let me turn it
3 over to co- chair. Charla, you want to take it
4 first?

5 MS. RATH: Yeah. Great. Thank you,
6 Scott. And thanks for those remarks. Looking
7 forward to seeing the National Spectrum Strategy
8 as it unfolds. What I wanted to start by saying
9 is that just to congratulate all the members of
10 the CSMAC right now, we've had an incredibly busy
11 quarter. And today, I think for the only time
12 today, we'll actually have all four subcommittees
13 reporting. One, the UWB Committee will be
14 presenting its final report, and another, CBRS
15 will be presenting its first report, having just
16 begun its work in December. So, and then,
17 obviously, the 6G and Electromagnetic
18 Compatibility Improvement Subcommittees will be
19 reporting on their ongoing work. So just moving
20 right along to hear from them. I'll send it over
21 to Jennifer for any additional remarks and roll
22 call.

1 MS. MANNER: Thank you so much, Charla
2 and Scott. We're definitely looking forward to
3 reviewing and seeing the National Spectrum
4 Strategy that's being proposed. And I just want
5 to echo, Charla's "Thanks" to all of our
6 cochairs, we know -- and our members -- it's been
7 an incredibly busy quarter. Charla and I can't
8 even keep up with all the calls, I think. We're
9 running after you, so we appreciate everyone's
10 work and look forward to hearing from the reports.
11 I just wanted to take a quick roll call and I'll
12 do this in alphabetical order. So first -- and if
13 you can say here, that would be best because I'm
14 not looking -- Jennifer Alvarez?

15 MS. ALVAREZ: Here.

16 MS. MANNER: Reza Arefi?

17 MR. AREFI: Here.

18 MS. MANNER: Donna Bethea-Murphy?

19 MS. MURPHY: Here.

20 MS. MANNER: Hilary Cain?

21 MS. CAIN: Here.

22 MS. MANNER: Oh, I see. Michael

1 Calabrese?

2 MR. CALABRESE: Here.

3 MS. MANNER: Thom Dombrowsky?

4 MR. DUBROVSKY: Here.

5 MS. MANNER: Mark Gibson?

6 MR. GIBSON: Here.

7 MS. MANNER: Dale Hatfield?

8 MR. HATFIELD: Here.

9 MS. MANNER: Carolyn Kahn?

10 MS. KAHN: Here.

11 MS. MANNER: Then there's me. I'm here.

12 Paul Margie?

13 MR. MARGIE: Here.

14 MS. MANNER: And Jennifer McCarthy?

15 MS. MCCARTHY: Here.

16 MS. MANNER: Karl Nebbia?

17 MR. NEBBIA: Here.

18 MS. MANNER: Louis Peraertz?

19 MR. PERAERTZ: Here.

20 MS. MANNER: Danielle Piñeres?

21 MS. PIÑERES: Here.

22 MS. MANNER: Charla Rath?

1 MS. RATH: Here.

2 MS. MANNER: Glenn Reynolds?

3 MR. REYNOLDS: Here.

4 MS. MANNER: Dennis Roberson?

5 MR. ROBERSON: Here.

6 MS. MANNER: Andrew Roy?

7 MR. ROY: Here.

8 MS. MANNER: Jesse Russell? Jesse?

9 Okay, Steve Sharkey?

10 MR. SHARKEY: Here.

11 MS. MANNER: Mariam Sorond?

12 MS. SOROOND: Here.

13 MS. MANNER: Rikin Thakker? Rikin?

14 Okay, Bryan Tramont?

15 MR. TRAMONT: Here.

16 MS. MANNER: Jennifer Warren? I don't
17 think she's here today.

18 Robert Weller?

19 MR. WELLER: Good morning. Here.

20 MS. MANNER: Patrick Walsh? And last
21 but not least, David Wright.

22 MR. WRIGHT: Here.

1 MS. MANNER: Okay, thank you. And with
2 that, I'm going to turn the floor over to Charles
3 Cooper, who's the Associate Administrator of
4 Spectrum Management at NTIA. Charles, please take
5 it away.

6 MR. COOPER: Thank you so much,
7 Jennifer, and thank you, Scott Harris, for your
8 opening remarks and kind of setting the stage for
9 all the great activities we're going to be doing
10 at Spectrum here at NTIA. We're certainly going
11 to be extremely busy with developing the national
12 Spectrum strategy work, and we're looking forward
13 to the request for comments that will be coming
14 out in the near future, along with the public
15 listing sessions and the other input we are going
16 to receive. Before we march on to the
17 subcommittee reports, I just want to touch on a
18 few other items that OSM, the Office of Spectrum
19 Management remains focused as we're moving into
20 the spring.

21 First, we're continuing to work with the
22 Department of Defense to evaluate the potential of

1 repurposing some or all of the 3100 or 3450
2 megahertz band. This, of course, is a lot of
3 attention being devoted to this and we continue to
4 make it a top priority for the assessment. It's a
5 very challenging band and we're working very
6 closely with the DoD on this effort. In a similar
7 light, we are following with interest the FCC's
8 Notice of Inquiry regarding the 12.7 gigahertz
9 band, which was released recently. The Commission
10 is asking whether broadband mobile networks can be
11 accommodated in this band, which is primarily
12 non-federal, but we do have some equities, both
13 cochannel and adjacent channel that we need to be
14 concerned about. That includes NASA's Deep Space
15 Network.

16 On another topic, and particularly a
17 trend we are viewing with interest, is the growing
18 integration of the satellite to mobile networks,
19 commonly known as direct to handset market. This
20 development clearly shows the potential for
21 providing connectivity in remote and trouble
22 areas, which have often been underserved. The

1 Commission is considering a Notice of Proposed
2 Rulemaking for a regulatory framework to address
3 this market development, so we're following that
4 closely.

5 Finally, I would like to underline that
6 this is a WRC year and it is packed already with
7 international meetings, bilateral meetings,
8 delegation meetings, as we prepare for the actual
9 WRC to be held in November. Already, the
10 Conference Preparatory Meeting, otherwise called
11 as the CPM, begins in just a couple of weeks and
12 will be followed by the CITELE, which is here in
13 Region Two in the Americas Prep Meetings later on
14 this year.

15 The Department of State has announced
16 that Anna Gomez will be leading the delegations
17 and preparations for WRC 23, as Senior Advisor for
18 International Information and Communications
19 Policy at State. She's a seasoned policymaker and
20 veteran, having served both on NTIA's Deputy
21 Administrator from 2009 - 2013 and also Deputy
22 Chief of the FCC's International Bureau. Of

1 course, NTA will be working closely with her as we
2 collectively move to finalize US proposals and
3 positions.

4 So, as you can see, not only with CSMAC
5 with that busy quarter, but we're very busy here
6 with an NTIA in the office of Spectrum Management
7 with the National Spectrum Strategy work, the WRC
8 preparations, and hey, I've got to put a plug in
9 as well for our upcoming September Spectrum
10 Symposium that we hold on an annual basis. I will
11 say though, that the exciting time to be in the
12 Spectrum community as we deal with so many
13 opportunities to create change going forward.

14 I'll turn this mic back over to the
15 co-chairs now, unless there are any questions from
16 the members that I can field at this point. Thank
17 you so much for your time. And now back to
18 Jennifer for sure.

19 MS. RATH: Actually it's me, but thanks
20 Charles. And we've got a quiet group today, but
21 we've got a lot of reports to go through and
22 hopefully we will have some questions and good

1 discussions. So first, Mariam, if you want to
2 start with the CBRS Subcommittee.

3 MS. SOROND: Can you see the
4 presentation?

5 MS. RATH: Yes.

6 MS. SOROND: Okay, great. Let me put it
7 in PowerPoint view. Okay, well, thank you
8 everyone. This is a brief read out of the CBRS
9 Subcommittee status and progress for today's
10 meeting. Starting from our subcommittee members.
11 I'm not going to read out all the names, but this
12 subcommittee is chaired by myself and Patrick
13 Walsh, who couldn't make the call today. We have
14 NTIA liaisons, Nick and Ed, and I can just say
15 about our great members that we have a very
16 diversified set of views on this subcommittee,
17 which I think is going to lead to a really
18 interesting outcome for the report.

19 Just a brief sort of reminder of what
20 the NTIA question is. I'm not sure if we
21 presented this to the CSMAC in this final format,
22 but just those four highlighted questions here.

1 Number one is what are general and specific
2 lessons learned from CBRS framework for commercial
3 operations sharing with federal incumbents, both
4 positive and negative? Second one is how could
5 the commercial federal sharing and CBRS be
6 improved? Third one, what from this CBRS spectrum
7 sharing experience should be considered for
8 implementation in other bands and cases? What --
9 And the fourth and final one is what from this
10 CBRS sharing experience should be avoided in other
11 bands and cases? Our progress so far, we kicked
12 off in January, where with our first call, and
13 we've had two since our next call is March 23,
14 which will be our third call.

15 What we have started to do is actually,
16 compile a list of stakeholders, a very broad set
17 of stakeholders across the industry, from the
18 federal and the commercial side that we've
19 compiled the list and shared with the subcommittee
20 in sort of the dialogues that we've had. We've
21 also enhanced the original questions to kind of
22 put sub bullets under the original questions that

1 go along with these interview sessions. These
2 interview sessions for the stakeholders will also
3 be used as a data collection mechanism for us to
4 look at the reports and the work that has been
5 done in different sort of sides of the CBRS group.

6 So, we have identified the subcommittee
7 members that are the points of contacts for
8 reaching out to these stakeholders, and they are
9 in the process of setting up these interviews and
10 discussions. We will hopefully in the next CSMAC,
11 be able to give a highlight of all of these
12 discussions. And that is all I had for today.
13 Thank you.

14 MS. RATH: Thanks, Mariam. Any
15 questions for Mariam on the subcommittee? --
16 Actually, just a reminder, the CSMAC members, you
17 can use the raise hand function if you have
18 questions or want to discuss things. So, it seems
19 like there are no questions for you, Mariam. So,
20 we'll move on to the 6G subcommittee report.

21 MR. HARRIS: I think everybody needs
22 coffee this morning. No questions from any of

1 you. Wake up, people! I got a laugh out of
2 Bryan, finally.

3 MR. TRAMONT: Scott, I've been laughing
4 at your jokes for years. What are you talking
5 about?

6 MR. NEBBIA: I put on my hand, Charla.
7 Is that visible?

8 MS. RATH: Okay, yeah. I can see that,
9 Karl, sorry.

10 MR. NEBBIA: Let me figure out how to
11 lower it now. So, I had one question more for
12 NTIA than this specific committee, but this
13 committee is, I think, an example of what we're
14 doing, where we're looking for a lot of
15 conversation with the federal agencies coming up
16 and just wondering whether there are any steps
17 that NTIA plans on taking to kind of inform them
18 that we're coming and that we would be blessed by
19 their support and cooperation. A lot of times,
20 agencies don't want to talk to commercial groups
21 or don't want to talk to groups that are going to
22 put their responses --

1 MR. HARRIS: Oh Karl, they're happy to
2 talk to you.

3 MR. NEBBIA: Yes, I know they are. But
4 I think it would certainly be helpful if it were
5 clear to the agencies that they are free to talk
6 to us and our work would be benefit by their
7 involvement. So just a thought.

8 MR. COOPER: Thank you so much, Karl,
9 for that. I think it's an issue that we want to
10 raise up as well with the NTIA staff that is
11 staffed with each one of the questions and to see
12 what the mechanism could be to accommodate that,
13 Karl. Thank you for raising the issue.

14 MR. NEBBIA: Thank you, Charles.

15 MS. RATH: Thanks for that. Any other
16 questions before we move on to the 6G
17 subcommittee?

18 All right, Reza, I think you are going
19 to kick off that discussion, correct?

20 MR. ARAFI: Yes. Can you see my slide?

21 MS. RATH: Yeah.

22 MR. ARAFI: Yeah. Okay, great. Thank

1 you. Let's move on. First off, list of members,
2 we have a fantastic group of people helping us
3 here, with, of course, with Jessica being our FCC
4 liaison and Kevin Holmes, FCC observer, and then
5 we have Rich as our NTIA liaison.

6 The mandate just to refresh people's
7 mindset on this, this hasn't changed, of course,
8 since last time we presented, but basically, we
9 were asked by NTIA to consider use cases for 6G
10 beyond the traditional use cases of previous
11 generations, and also the impact of these use
12 cases on federal government users. There were
13 specific questions also with respect to the use of
14 the terahertz or use of the terahertz or
15 sub-terahertz band by 6G and how these would
16 impact government users in that range, and are
17 there any other spectrum bands that may be
18 appropriate for 6G? And we are also, because of
19 the shift that we have seen in industry and
20 academia, over -- away from sub-terahertz bands,
21 more towards lower frequency wave. We have also
22 switched in our focus, and we're also paying

1 attention to those more bit band type bands as
2 well.

3 Moving on, our schedule, as you know, we
4 started last summer. We hold regular subcommittee
5 meetings once a month, sometimes more frequent
6 than that, and we have been in the process of
7 conducting interviews, and we are right in the
8 middle of that now. We will analyze the
9 information, and we develop our report, our draft
10 report targeting in the summer, and we will
11 deliver our final report in December.

12 In terms of interviews, we cast a very
13 wide net. We are contacting many federal agencies
14 in terms of industry, both terrestrial as well as
15 space sector. We are talking to service
16 providers, cable companies, equipment
17 manufacturers, chip manufacturers, hyperscalers,
18 virtualization companies, HAPS manufacturers, and
19 also including academia and nonprofit
20 organizations, including some international
21 government funded or public private partnerships
22 in other parts of the world, like in Europe or in

1 Japan and Korea. And we request written or and/
2 or verbal responses on the questions.

3 This is a list of all the entities that
4 we have either contacted or we are in the process
5 of contacting. The ones in bold are the ones that
6 we have already conducted interviews and received
7 their input. The ones that are in italics are the
8 ones that we are going to contact but some of
9 these have already changed and updated since we
10 sent the slides out.

11 And with that, I'll ask Carolyn to take
12 us through some of the other slides. Carolyn,
13 please go ahead.

14 MS. KAHN: Great, thank you. So the
15 next couple of slides are going to show 6G use
16 cases. This isn't our final list. It's based on
17 what we've captured from Next G Alliance and some
18 of the other organizations that have published
19 about 6G use cases in the public domain. So,
20 we'll be digging into it deeper and updating. So,
21 Danielle, in a couple of minutes we'll talk more
22 about the unlicensed and shared spectrum use cases

1 for 6G. But as far as traditional wireless
2 communications, we expect it to be extended to 6G.
3 So, this includes exclusively licensed cellular
4 satellites and HAPS systems. And terrestrial and
5 non-terrestrial connectivity can increase coverage
6 and capacity to support use cases such as rural
7 IoT, remote data collection, closing the digital
8 divide. There are also non-traditional 6G use
9 cases, like immersive education that enables
10 digital representation of real world experiences,
11 like a virtual field trip or a virtual lab
12 environment to improve learning and it also
13 increases accessibility. Other non-traditional
14 use cases for 6G include the network fabric, to AI
15 machine learning, holograms, digital twinning, and
16 personalized user experiences. Next slide,
17 please.

18 Other 6G use cases include, in the
19 safety category, national security and public
20 safety applications. Also, for sensors, connected
21 machines, robots, internet of things, autonomous
22 systems, for instance, that interact with and work

1 more collaboratively with humans, radar that have
2 systems that can perceive their surroundings using
3 radar and this capability is integrated into a
4 network. There's communication in space, and
5 other scientific applications from sustainability,
6 to security, to 3D hyper-accurate positioning,
7 localization and tracking, and smart agriculture
8 to enable precise smart farming, for instance.
9 Danielle, I'll turn it over to you now.

10 MS. PIÑERES: Great. Thanks, Carolyn.
11 So, I took an initial look at what kind of
12 unlicensed and shared spectrum use cases folks are
13 talking about regarding 6G and next generation
14 networking and I think what I found so far is
15 that, like 5G next generation wireless networks
16 will be heterogeneous and rely on access to a
17 variety of different spectrum bands that are
18 regulated in very different ways using a variety
19 of different technologies. And so, I think the
20 big takeaway is from the list that Carolyn shared
21 on the previous slide, we see a lot of those
22 things repeated in literature on unlicensed and

1 shared spectrum use cases for next generation
2 networking. A lot of these things we can
3 anticipate, I think, seeing both licensed and
4 unlicensed spectrum used for these different use
5 cases. There's a preliminary list here. I'll
6 just read off some of them for you all so you can
7 see what we found so far. But device to device
8 communications for home networking, things like
9 ARVR, whole home video distribution, also for
10 things like telemedicine or enterprise
11 connectivity, training and education, as well as
12 large venue networking. Sensing also --
13 environmental sensing, condition monitoring, as
14 well as motion control, internet of things,
15 ultra-reliable low latency communication
16 transmissions, including for private wireless
17 networks for industrial or smart factory
18 operations, applications that require very high
19 data rates and low latency and synchronized
20 transmissions across devices, as well as wireless
21 local and personal area networks, and information
22 showers that rely on millimeter wave unlicensed

1 bands, small cell backhaul infrastructure,
2 millimeter wave distribution networks for both
3 indoor and outdoor, point-to-point and
4 point-to-multipoint connectivity, as well as In-X
5 -- what we call In-X subnetworks which can operate
6 autonomously when out of coverage areas of a wide
7 area network but also can benefit from those wide
8 area networks when available. These are highly
9 specialized radio cells that can be installed
10 within particular entities where an application
11 runs. So, things like robots, or vehicles, and
12 even in the human body. And with that, I will
13 pass it back. Thank you.

14 MR. ARAFI: Thank you. All right, thank
15 you. Next on Potential Spectrum Bands, part of
16 our report is a summary of the situation with
17 spectrum bands, potential spectrum bands that
18 could be used for 6G. We are -- this -- most of
19 it is what Mark Gibson has done: cataloging
20 spectrum from 5 gigahertz to 3 terahertz, and we
21 will actually expand that to starting from 3.1
22 gigahertz. So, from almost 3 gigahertz to 3

1 terahertz. In terms of the spectrum bands, the
2 information that has been collected are
3 international, primary allocations, secondary
4 allocations, together with important footnotes in
5 all three regions of the ITU. Also domestic,
6 federal and non-federal, primary and secondary
7 allocations and their associated footnotes,
8 identifying where the unlicensed bands are, where
9 the ISM bands are, the bandwidth of each section,
10 and also information about atmospheric data and
11 atmospheric absorption peaks that become important
12 in terms of access.

13 Possible additions to this work include
14 collecting information on usage data, if
15 available, for any of these pieces of spectrum,
16 where major fix link, commercial fixed links bands
17 are, for instance, 3GPP bands, federal bands, et
18 cetera; whatever information we can get. Also,
19 another possible addition is bands that are
20 currently proposed for consideration for 6G in
21 different regions. And as we go forward with the
22 regional prep meetings already in process in all

1 three regions, more of that information will
2 become available. We have some already, for
3 instance, from APG and others. CITELE will be next.
4 We know some things about CPT, so we will add
5 those as we go. And at the end, another possible
6 addition is external sources for how much spectrum
7 would be needed for different 6G applications.
8 And as we go forward, for instance, we know Next G
9 Alliance is working on some of that, and we bring
10 in those type of information also as they become
11 available.

12 Next, back to you, Carolyn.

13 MS. KAHN: Okay, great, thanks. So,
14 there's been a lot of early work done towards
15 developing 6G, which is great. Typically, in the
16 earliest phases of technology development, there
17 is a lot of speculation, and our subcommittee is
18 taking a realistic approach. So, we're using
19 available information, we're using a variety of
20 sources, and through these discussions, we've
21 identified some key uncertainties in the
22 development of 6G. So, this includes that 6G

1 remains undefined. Another uncertainty is the
2 evolution of the connectivity ecosystem, what
3 features will be ready by specified timelines, and
4 will the ability of systems be able to meet the
5 performance requirements by the expected
6 timelines. There's uncertainty around the demand
7 for 6G applications and services, and the
8 development of the specifications to support the
9 use cases, which is dependent on profitability
10 business models and demand for those use cases.
11 Next slide.

12 There are also some challenges that
13 we've identified. First is the need for research
14 to support 6G development, including security and
15 privacy issues. And 6G is very dependent on the
16 development of other technologies, such as AI,
17 machine learning. Six G is more complex, and so
18 the systems then become more complex. So, these
19 system level challenges, can they achieve the very
20 high reliability and availability that's expected?
21 Another challenge is the risk of global standard
22 fragmentation and the need for spectrum

1 availability and flexibility. Next slide, please.

2 So, our subcommittee has important work
3 ahead. We're delving into our interview responses
4 and analyzing information, which will be an
5 important component to the input and
6 recommendations we provide to NTIA. Based on our
7 work to date, we offer these observations: First,
8 federal agency engagement early on will help shape
9 use cases. Incorporating federal agencies 6G use
10 cases and spectrum needs into the development of
11 6G will help them best leverage and benefit from
12 6G. It will provide an opportunity for R&D gaps
13 for federal agencies to be identified early, and
14 then these can be built into a national R&D
15 spectrum strategy and roadmap. And I'm very
16 excited to hear about the kickoff of the national
17 spectrum strategy that NTIA mentioned at the
18 beginning of this meeting. So that's great.

19 Also, standards and technology development can be
20 shaped to close these gaps.

21 Then to support 6G communications, more
22 spectrum flexibility, and advanced spectrum

1 sharing techniques will be important, such as
2 schedulers that enable more precise timing,
3 information that enables the density of use to be
4 increased, as well as customizing sharing
5 techniques to frequency bands such as what's done
6 in mid band may be different than what's needed in
7 subterrahertz and also the range of incumbent
8 systems. Another area is digitizing spectrum
9 sharing for some bands and or use cases. So, all
10 of these will help increase spectrum flexibility
11 and availability.

12 So, this concludes our 6G subcommittee
13 update, and we welcome questions and comments.

14 MS. RATH: It looks like Dennis has a
15 question. If you --

16 MR. ROBERSON: Yeah, not so much a
17 question, but rather an observation, and it
18 largely came from a session that we held
19 yesterday. And that is that, more so than any
20 past generation, 6G embraces cultural norms and
21 expectations in a way that previous generations
22 have not. And this brings in all kinds of

1 questions of privacy and availability of
2 information and intrusiveness into people's lives
3 with the positive intent of being a more
4 supportive environment than we've previously seen.
5 The challenge that was discussed yesterday -- so
6 this is late breaking news, well beyond the time
7 when the slides were produced -- is the fracturing
8 that may come to 6G based on the cultural
9 differences around the world. The expectations of
10 what is -- which direction is positive and which
11 direction is negative as we look at the cultural
12 norms in different societies, is a real open
13 concern that has not been adequately addressed,
14 but it adds to the uncertainty of the environment.
15 So, a statement much more so than a question, but
16 I introduced that and since it was a significant
17 point of conversation in our discussions that
18 Glenn Reynolds led yesterday.

19 MR. ARAFI: Yeah, very good point,
20 Dennis, yeah. And I think that -- at least from
21 the point of view of next year alliance on the
22 work that is being conducted over there -- they

1 are cognizant of this and they are in contact with
2 similar projects in Europe and in some parts of
3 Asia. And this is one of the items that they
4 collaborate on. But I certainly agree it's a very
5 important element very different from previous
6 generations.

7 MS. RATH: Thanks. I think Andy is up
8 next.

9 MR. ROY: Thank you, Charla, and thank
10 you for the presentation.

11 Yeah, I was actually, I was interested
12 to see the challenges slide as well. It's good to
13 see the considerations there. You know, system
14 level challenges, system availability, coming from
15 an industry that has sometimes nine nines
16 availability requirements, and code review
17 requirements, and design level assurance. Yeah, I
18 can see that being an interesting consideration.

19 One question I had was on longevity of
20 systems. As these sort of commercial wireless
21 technologies evolve beyond traditional consumer
22 electronics, which generally have a shorter life

1 cycle, you start to sort of interact with
2 applications and industries that maybe they're not
3 changing out equipment for 10, 20, 30 years. In
4 discussions with chip manufacturers and so forth,
5 what's been the considerations for extended
6 support for chips, spares and so forth, and
7 networks that could maybe support those use cases?
8 Obviously for those industries or even federal
9 agencies, saying, "well, you do this every 30
10 years at the moment, but now you're on a ten year
11 replacement cycle," could have a significant
12 implication.

13 MR. AREFI: Yes, very good observation.
14 I think it wasn't a question, but a very good
15 comment. And that's part of probably part of the
16 issues with monetization of 5G in non- EMVB
17 aspects is related also to what you observe, Andy.

18 MR. REYNOLDS: I guess I might add, just
19 on behalf of Next G alliance, that -- I think that
20 point is one of the reasons why Next G Alliance is
21 spending a significant amount of time trying to
22 reach out to the vertical industries that are

1 likely to drive 6G adoption and figure out how
2 they're going to be used. And presumably, I think
3 it's obviously a very good question: how do you
4 maintain those? What's the long term strategy for
5 those types of devices?

6 MS. KAHN: Great. I mean, really good
7 discussion, good input. I see there's some other
8 hands raised?

9 MS. RATH: Yeah, I'm sorry, I thought I
10 just noticed that Karl is up next.

11 MR. NEBBIA: Okay, I got a couple -- a
12 couple questions. One of the challenges we always
13 have in these groups is that the topic gets very
14 expansive and the possibility that this topic gets
15 to be everything 6G, which interestingly enough,
16 is -- I'm not sure how you get specific in your
17 answers if there's no definition of 6G. So, I
18 don't know how the group is going to deal with
19 that if by the time they want to conclude on
20 recommendations, that hasn't been defined. How
21 does all the rest of it makes sense?

22 But I also wanted to draw attention to

1 one of the slides, talked about NTIA's
2 clarification regarding the scope, talking about
3 6G services, of course. But then, the effort
4 should consider generally the benefits the federal
5 agency -- federal government user and positives,
6 and so on, for the federal government and how
7 those agencies can benefit broadly from 6G. So,
8 as we look forward and there's this temptation to
9 talk about everything that 6G can be, and various
10 things, just to try to remember that ultimately
11 that's kind of what we have to answer is how is
12 the federal agencies -- the federal government
13 going to use this? And one of the questions that
14 comes up in that light is are we talking about the
15 federal agencies operating 6G networks or only
16 accessing or using 6G technology as part of
17 commercial networks for federal government
18 purposes? I remember I think at least with 5G,
19 there was some concern raised when DoD started
20 talking about operating 5G networks and the
21 commercial industry kind of got uneasy with that.
22 So anyway, just some thoughts along the way. But

1 I think there's always a temptation that these
2 topics become very broad and ultimately it has to
3 get back to the point of what does this do for the
4 federal government? Thanks.

5 MS. KAHN: Good point, Carl. And yes,
6 so we're definitely interested in federal agency
7 input and use cases, but also those spectrum
8 points that you mentioned as well, so thank you.

9 MR. AREFI: Maybe one more thing I add,
10 Karl, you mentioned defining -- definition of 6G.
11 I don't think anyone should wait for that. I
12 don't think there will be any, at any point in
13 time, any entity saying that "Oh, I define 6G."
14 There's no definition of 5G either, right? So,
15 things develop as they develop and I think we're
16 going to focus on what is -- on what our mandate
17 is. And yeah, I fully agree with you that there's
18 also -- there's always that danger of scope creep
19 but we'll try to stay focused.

20 MS. RATH: Alright, thanks. Paul, I
21 think you're next in line.

22 MR. MARGIE: Great, thank you. And so,

1 first off, this looks like a huge amount of work
2 and you've accomplished a ton, especially on new
3 use cases and the spectrum needs. And just
4 following up a little bit on what Karl said,
5 thinking about the NTIA question at the top on
6 federal users use of 6G improvements. Have you
7 heard or would it be valuable to be asking
8 interviewees about improvements in 6G on
9 interference tolerance, including improved
10 receiver performance issues, RF use efficiency
11 gains, energy use efficiency gains? These are the
12 kind of things that I think we're starting to hear
13 about not only in 6G, but in 5G, that there are
14 substantial improvements on each of these. And
15 those I would imagine, would be the kinds of
16 technologies that the federal users would be
17 interested in hearing about. And that might be
18 where you've got a federal user as a 6G user. But
19 it might also be because then, kind of American
20 technological leadership in RF efficiency and
21 receiver performance might be advantageous to the
22 government users as well. So, I don't know if

1 you've run into any of those things or if that's
2 part of the plan in the questions to the
3 interviewees, but just following up on what Karl
4 said, those are the kinds of things that if I were
5 in the federal user community, I'd be asking
6 about.

7 MR. AREFI: Carolyn, you want to address
8 that or do you want --

9 MS. KAHN: Sure, yeah, those are great
10 points. So, our questions have been broad.
11 We're, you know -- those are good thoughts to go
12 down some of those areas. And the new technology
13 advancements, I think there's also some synergies
14 with the ECI Subcommittee so we can leverage that
15 as well. But I think those are some good points
16 and could bubble up to some research needs.

17 MR. AREFI: Yeah, maybe one more thing I
18 add is that the spectrum sharing was -- is not
19 part of the mandate. I think that's part of the
20 clarification I got from NTIA. But I agree with
21 you Paul, that I think touching some of that is
22 probably inevitable in order to answer the

1 questions that we are -- they're asked. So, I
2 expect our final report to include some of those
3 aspects at least.

4 MS. RATH: All right, so next up is
5 Donna.

6 MS. BETHEA-MURPHY: Thanks very much and
7 thanks for all the work that was done in such a
8 short period of time. Just a couple of comments:
9 One is when you say wireless, I assume you mean
10 any device that's not wired or any system that's
11 not wired, whether it's satellite, HIBS, HAPS, or
12 terrestrial. My next comment is when I look at
13 3000 gigahertz, I think to myself that seems quite
14 interesting, considering lack of definition and
15 issues like that, but what it doesn't seem to talk
16 about is the evolution of current spectrum,
17 whether that's satellite spectrum or whether
18 that's terrestrial wireless spectrum. So, I
19 wonder if that's going to be added in there.

20 Two other quick comments. I agree on
21 the cultural aspects. We've seen that at the ITU
22 and the work done at 5D countries suggesting that

1 some of this is really quite stepping into their
2 privacy, their country's privacy, their beliefs.
3 So, I take the point of the previous speaker and I
4 do think that something like 6G when we talk about
5 IoT type systems is not going to be one definition
6 of speed and latency. So those are my general
7 comments.

8 MR. AREFI: Yeah, thank you Donna, for
9 the observations. With respect to the range of
10 frequencies, this is of course like the base
11 information now we are collecting from this very
12 wide range, but once we add this other information
13 on top, I think it will be a much smaller subset.
14 And again --

15 MS. BETHEA-MURPHY: -- And just quickly,
16 I want to respond to that. I just don't want to
17 give the impression to government agencies that we
18 are saying that this huge amount of spectrum is
19 needed for something that's not quite divine. So,
20 thank you for that clarification.

21 MR. AREFI: Sure. Definitely, yeah.
22 And we still have not decided exactly -- and

1 that's what we're discussing in the subcommittee
2 -- we haven't decided exactly how to incorporate
3 this data into the final report. So, we'll make
4 sure -- however it's reflective doesn't imply what
5 you just said. Thank you.

6 MS. RATH: All right, well, Scott, you
7 should be happy now that it seems like everybody's
8 had their cup of coffee. So, moving on to
9 Jennifer Manner. I have to use your last name,
10 Jennifer, since there are so many Jennifers on the
11 committee.

12 MS. MANNER: Well, you know, you can
13 never have too many Jennifers just so you -- So,
14 thank you again for all the work on this report.
15 I think it's terrific.

16 I want to go to the Challenges page for
17 a second, if I could. And it was actually
18 something that stood out to me, which was bullet
19 three on sustainability, including power
20 consumption. I think we should also think about
21 space sustainability. Six G is going to be a
22 tremendous user of the space resource and I think

1 that is something that we're going to look at.
2 And I just think as power consumption is something
3 we should be looking at; we should add and space
4 as well, just to make it clear that that that's
5 going to be a different issue. So much as 6G,
6 when you read the literature, is going to be space
7 based. So, thank you. That would be my only
8 suggestion.

9 MR. AREFI: Thank you for the
10 suggestion. We'll take that into account.

11 MS. RATH: Thanks. I saw Mark Gibson's
12 hand up, but it's been lowered. I don't know,
13 Mark, whether you had a comment or you --

14 MR. GIBSON: -- Well, I put it on up,
15 Charla -- thanks -- to address Donna's concern
16 or question, but Reza addressed it. But I guess
17 what I think I'd add is that with respect to
18 terahertz, I think for the purposes of our work,
19 we're saying Terahertz begins at 300 gigahertz.
20 There are zero allocations above 275.5 GHz. So
21 that's all-greenfield spectrum, to the extent you
22 think terahertz is greenfield. In the 95 to 275

1 Megahertz, or Gigahertz band, there's a lot of
2 allocations there, but they're all shared, you
3 know -- federal, commercial, and also across all
4 regions. So that's another area. And a lot of
5 that stuff is Earth exploration, satellite or
6 research. I think as we -- as this work matures,
7 looking at some of those things as we address some
8 of what you see in front of you is part of the
9 challenge. You know, you see here we're looking
10 at 3.1 gigahertz to 3000 gigahertz. If you look
11 at just 3.1 to 275, there are over 190 gigahertz
12 of spectrum in there and over 127 allocations.
13 So, it's going to take a lot of work to sort out
14 what that means. And I think what we'll be doing
15 is setting this up for future work because as
16 you've heard throughout this whole presentation,
17 6G is still a little nebulous. So, trying to put
18 actual spectrum requirements on something that's
19 nebulous will give you spectrum requirements that
20 are nebulous, and we kind of want to put a little
21 more details around that. So, I just kind of
22 wanted to put a little more clarity on that just

1 in case there's any questions. Or maybe not -- I
2 see your face.

3 MS. RATH: Thanks, any further comments
4 on that Reza or Carolyn?

5 MR. AREFI: No, not --

6 MS. RATH: Okay. I don't see anyone
7 else with their hand up. So, Jennifer moving over
8 to the last two subcommittees.

9 MR. NEBBIA: Robert just got his hand up
10 --

11 MS. RATH: Oh, Robert -- Bob.

12 MR. WELLER: Yeah, sorry I'm a little
13 bit late. I think augmented reality and virtual
14 reality are really 5G applications, and our
15 friends at Ericsson use this buzz phrase that I
16 kind of like, "the Internet of the senses," and I
17 think some of your slides refer to some of those
18 applications with kind of haptics and a more
19 immersive experience that goes even beyond virtual
20 reality. So, if you like that phrase, I'm
21 suggesting that you might want to consider using
22 it. Thanks.

1 MS. KAHN: Thanks for this adjustment.

2 Thank you.

3 MS. RATH: All right, so once again, do
4 we have any other thoughts or comments before
5 moving on to the next two subcommittees? All
6 right, Jennifer.

7 MS. MANNER: Thank you so much, and
8 those are great reports and terrific work going
9 on. I'm going to next turn to the Electromagnetic
10 Compatibility Improvements Working Group, and I'm
11 going to turn that over to Tom Dombrowsky for
12 introductions, please. Thom?

13 MR. DOMBROWSKI: Thanks. Is everyone
14 able to see my screen at this point? Okay, I see
15 read shaking up and down. Just quickly, we've got
16 our subcommittee members here, and I'll note that
17 we have not listed Nick LaSorte and Ed Drocella,
18 but they have been active NTIA liaisons and very,
19 very helpful moving progress, along with Jessica
20 Quinley and Kevin Holmes, who are the FCC folks. I
21 and Donna Bethea- Murphy are co-chairing this.
22 And we have a very active committee that's been

1 very helpful in moving things along. And as we go
2 to the sort of questions, just to remind
3 everybody, we've got a fairly narrow, tailored set
4 of questions that are really focused on
5 coexistence between aeronautical radars and
6 commercial wireless systems. So, what we've been
7 trying to do is drill down more and more on that.

8 And I'm going to skip to the next page
9 where we actually talk about what we've actually
10 been doing and let Donna sort of take the next
11 couple and I'll jump in after she hands back to
12 me.

13 MS. BETHEA-MURPHY: Thanks, Thom. And
14 again, we've had a very active subgroup, and
15 thanks to everyone's efforts. We've met formally
16 once a month but there's been a lot of work in
17 between the meetings. We've had two briefings
18 with NTIA to discuss the Incumbent Informing
19 Compatibility Program, and we've asked a huge
20 series of questions to just better understand it
21 and to figure out how we're going to include that
22 in our work. We expect to send some additional

1 questions and to include the -- these findings in
2 our final report. We've also drafted questions
3 and sent out to government agencies to interview
4 them in March. And we're going to, once we
5 finalize the interview times and met with them,
6 we're going to include these in our final report
7 as well. And the hope is we've also accumulated
8 examples of other EMC analysis, and we hope all
9 these examples will help the federal agencies for
10 insight. Thom over to you.

11 MR. DOMBROWSKY: Yeah, I think we've got
12 a series of questions that the subcommittee have
13 come up with, and we've gotten some hesitancy from
14 the federal agencies in responding to this
15 question. So, one of the ideas we received from
16 NTIA that we're now pivoting to is maybe we come
17 up with past examples/another framework or two of
18 EMC analysis that could actually draw out
19 reactions from the federal agencies. And again,
20 NTIA has been very helpful -- into Karl Nebbia's
21 earlier point -- of reaching out to these federal
22 agencies to sort of convince them that this work

1 is going to be beneficial and helpful for them to
2 provide some input to the committee so that we can
3 actually move forward on how to help with
4 coexistence going forward.

5 We do have a draft report that's nearing
6 completion. We've got most inputs to that. It's
7 probably a 12 - 15-page report. The plan will be
8 to incorporate any interview information, as well
9 as the IIC information into that report. And then
10 we're working towards drafting some actionable
11 recommendations that the subcommittee can address
12 at the next April May time frame. And then
13 obviously, we'll supplement that with whatever
14 findings we have from the interviews and the EMC
15 analyses discussions that we have going forward.
16 And I think again, the goal would be in the Summer
17 time frame, we'd have a fully developed report
18 with some example EMC analysis with summaries of
19 all the different meetings, the discussions we've
20 had, and then the full committee, full CSMAC
21 committee would actually have that well in advance
22 of anything being finalized since we have that at

1 the next go around. So, that's our read out --
2 feedback from what we've been up to. Open it up
3 to any questions folks may have.

4 MS. MANNER: Thank you so much. Do we
5 have any questions? I'll give folks a second to
6 raise their hand if there are any.

7 MS. BETHEA-MURPHY: And again, I want to
8 echo what Thom said, thanking NTIA for their
9 assistance with all the agencies.

10 MS. MANNER: Okay, perfect. Well, then,
11 thank you so much for your work, Thom and Donna
12 and the committee. You're doing a great job. And
13 I'm going to turn to our last committee of the
14 day. This is a committee where we're actually
15 having a vote today on ultra-wideband. And with
16 that, I'm going to turn it over to Dennis for
17 introduction. Please, Dennis.

18 MR. ROBERSON: First, can you see the
19 slides?

20 MS. MANNER: Yes, sir.

21 MR. ROBERSON: Alright, pretty good.
22 Get it into slideshow mode. There we go. The

1 chairs and the NTIA have carefully arranged the
2 agenda to save the best for last. So, this is the
3 report from the UWB Dream Team. We were asked to
4 sprint to the finish line and to produce our
5 report in quick order, which we believe we've
6 done. This represents the second and again, we
7 believe, final reading of our report. We did
8 present in some detail the contents of the report
9 in December, solicited additional input and did
10 receive some additional input, and we'll be
11 reviewing that.

12 But just to remind you all of what this
13 is all about, this was the charge, and the basis
14 for the work was the observation that there are a
15 substantial number of waiver requests, that have
16 been coming through, and that those requests, if
17 left unchecked, could effectively create de facto
18 changes to the UWB rules. And so, to get ahead of
19 that, the request was that we examine, as
20 questions, the potential ways in which NTIA could
21 propose changes to the rules or propose ways in
22 which waivers could be channeled so that easier

1 waivers could be administered quickly and more
2 challenging waivers would have the expectation
3 that they would, in fact, suffer the consequences
4 of their complexity and have delays in the
5 decision on the waivers. So that's the top level
6 reminder for you. Just quick view of the Dream
7 Team.

8 There were a couple of suggested changes
9 to the presentation. And what I'm going to do for
10 the record, we will go through the entire
11 presentation and we will do it very, very, very
12 quickly. So, you will be able to say that we did
13 review the entire presentation. And of course, if
14 there are questions, then it would be appropriate
15 to bring those up at the end. This is the
16 additional slide that was suggested by Dale
17 Hatfield. For those of us who know Dale well, it
18 is not a surprise that he made this suggestion,
19 and it was a very appropriate one. UWB offers
20 challenges in terms of how you enforce the rules
21 and particular bullet to the softwareization,
22 where it is quite possible to modify the

1 functionality and the characteristics of the radio
2 in this area. And so, to ensure that the devices,
3 once certified, will in fact continue to comply to
4 the rules is an important one, or the rules
5 including the waivers. So, this is a challenge
6 that is to be dealt with.

7 We have one other change that I'm going
8 to defer to Paul that is in the recommendations,
9 and I'm going to quickly and efficiently move to
10 the recommendations and let Paul take over in
11 discussing the recommendations.

12 MR. MARGIE: All right, thank you. And
13 thanks for everybody who participated in the
14 subcommittee and for all the folks that we
15 interviewed.

16 And so, we made recommendations in three
17 general areas. The first one are recommendations
18 to NTIA. The second is our recommendations to
19 ultrawide band waiver applicants. And the third
20 was our recommendations for government industry
21 collaboration. So, I'll go through them quickly
22 because you guys all saw these last time, and

1 there's only one change to these recommendations
2 that was made to us, which the subcommittee
3 thought was a good idea.

4 So, number one on recommendations for
5 NTIA, our first recommendation was that NTIA and
6 FCC use their collaboration mechanisms so that FCC
7 can provide a preview of waiver requests to NTIA.
8 The earlier NTIA knows about this, they know
9 what's -- it's coming. They know which ones are
10 active versus which ones are not yet active. The
11 better NTIA staff can marshal resources to make
12 sure that they do a review that meets that --
13 those twin goals that we talked about protecting
14 federal systems and at the same time trying to
15 move through to allow ultra-wideband to continue
16 to develop.

17 Number two is that we recommended NTIA
18 provide guidance on federal use characteristics
19 for industry studies. So, this would include
20 characteristics that industries should use in
21 their studies specific to ultrawide band. The
22 better the information into these studies, the

1 more useful it's going to be for NTIA and federal
2 agency staff. And right now, there is not
3 necessarily enough information on what assumptions
4 people should make. But more generally, we
5 thought that there should be an extension of the
6 spectrum compendium. And here's where one of the
7 changes is from our last presentation. In the
8 last CSMAC, there was a recommendation that we
9 make a recommendation that the spectrum compendium
10 go up to at least 12 GHz, which is a higher
11 frequency than are at least up to listed last
12 time. The subcommittee supported that idea.

13 Third, we recommended that NTIA identify
14 known ultrawide band techniques or levels that are
15 already known to be acceptable or more likely to
16 be acceptable. All of this is to make sure that
17 waiver requests are better on their way in so that
18 the amount of unnecessary work for NTIA staff is
19 reduced and the quality of the outcome goes up.

20 Next, we recommended that NTIA identify
21 the kinds of waiver requests that can be expedited
22 and take less time, and those that are likely to

1 need closer scrutiny and take more time. By
2 providing this information, again, this will
3 improve the waivers that are on their way in, so
4 that people know, "Okay, if I can design my waiver
5 that looks like this, I'm probably going to get a
6 quicker response from NTIA than one that looks
7 like that," where they're going to need to have
8 additional scrutiny and therefore more time.

9 Next, we recommended a new process to
10 track whether the implementing these changes would
11 have improved the process. And this was another
12 Dale Hatfield recommendation in the process, which
13 is exactly right. So too often we make changes
14 but then don't measure the effectiveness of those
15 changes, and we don't measure, we don't learn.
16 And so, the idea here is to see did we get it
17 right or did we not? And if we did not, that
18 means we can go back to the drawing board. Next
19 slide.

20 So, the next set of recommendations were
21 recommendations for ultrawide band waiver
22 applicants. Recommendation number one meet with

1 NTIA early. NTIA has dedicated staff to try to
2 get this done. And if you can talk to NTIA about
3 what's coming, let them know the types of waivers
4 that are there and get advice from them on whether
5 they're pain points that are within a proposed
6 idea. That's going to be better for you as an
7 ultrawide band applicant, and it's going to be
8 better for the government review of that process
9 down the line.

10 Number two is that we recommend
11 applicants should prepare a technical report on
12 the potential impact on the requested changes for
13 federal users. Some do this now and some do not,
14 and those that take the time to use some of the
15 new materials that we're recommending that NTIA
16 produce -- in terms of the kinds of inputs you
17 should make in those technical reports -- we think
18 will produce better outcomes.

19 Next is, we recommend -- and similarly,
20 we recommend that applicants take advantage of the
21 changes that we've recommended above -- by
22 considering those characteristics that NTIA

1 identifies to make waiver requests either easier
2 or harder. So, if NTIA is going to go and do all
3 the hard work of trying to give you additional
4 information, please use that additional
5 information so that the process is a little
6 better.

7 And in general, the recommendation that
8 we have based on our interviews with government
9 and with private sector is if you waiver,
10 applicants can demonstrate no greater impact than
11 earlier ultrawide band systems that are following
12 the existing rules. You can expect a lower risk
13 of delay. If you cannot do that, then you should
14 expect that there's going to be closer scrutiny
15 and the need for more time. Next slide, please.
16 This is the last one.

17 So, we also made some recommendations
18 for government/industry collaboration here. One
19 is that we recommend that NTIA and ultrawide band
20 industry entities work together to create a
21 generic set of studies for ultra-wideband industry
22 to produce to give NTIA some more tools. So,

1 earlier we talked about specific studies for a
2 specific waiver request. Here we're talking about
3 generic studies for ultrawide band in general. So
4 the more we can arm NTIA with good, reliable
5 information that is generic, the better job they
6 -- the more tools they have to do their job when
7 specific questions come before them.

8 And then last, we recommend working
9 together to identify discrete -- possible --
10 discrete changes to the FCC rules, maybe based on
11 already granted waivers, and this would achieve
12 the overall goal of protecting -- federal users
13 while reducing the need for waivers. The more we
14 can move to FCC rules for things that are -- we
15 already know are acceptable for federal users, the
16 less waivers we have and the less churn in the
17 system.

18 So, thank you very much and with that,
19 we present that to the full committee for
20 consideration.

21 MS. MANNER: Thank you so much. And
22 before we vote, I do want to open the floor up for

1 questions. So, do we have any questions from
2 anyone on this report?

3 Nicely done. So, I think we can move
4 forward with a vote. And Antonio, how would you
5 like to do this? I want to ask for against and
6 then abstains but do you keep track of it or do we
7 raise hands? How would you like to work it?

8 MR. RICHARDSON: Yes. You can just go
9 out on and just take a vote: yea, nay and then
10 abstain from it. Yes.

11 MS. MANNER: Okay, so do you want to
12 show hands or do you want people to use the raise
13 -- How would you just -- vocal -- Voice okay --
14 Sorry.

15 MR. RICHARDSON: I think voice will be
16 okay. I don't know if we can catch all the hand
17 raises.

18 MS. MANNER: Okay so, do you want me to
19 go through the list or just ask generally?

20 MR. RICHARDSON: General will be fine.

21 MS. MANNER: Okay. All those in favor,
22 say yea.

1 EVERYONE BUT ANDREW ROY: Yea.

2 MS. MANNER: All those opposed? Easy
3 count. And any abstentions?

4 MR. ROY: I abstain.

5 MS. MANNER: Thank you. So, we have one
6 abstention from Andrew Roy. Other than that, the
7 report is adopted by the CSMAC. So,
8 congratulations, everyone. And congratulations to
9 Paul and Dennis for taking the lead on this -- and
10 the rest of the committee.

11 So with that, I wanted to open the floor
12 to public comment, if we have any. And Antonio, I
13 don't know -- if you call the people how we handle
14 this, because I don't know that I can see who's --
15 raising their -- wants to speak, so I defer to
16 you.

17 MR. RICHARDSON: Yes. Give me one
18 moment to --

19 MS. MANNER: Please, thank you --

20 MR. RICHARDSON: -- Unmute them all.

21 MS. MANNER: Thank you.

22 COMPUTER AUDIO: The conference is now

1 in talk mode.

2 MR. RICHARDSON: Okay, so here's an
3 opportunity for the public now they can hear you
4 --

5 MS. MANNER: -- Okay --

6 MR. RICHARDSON: -- I mean, they can
7 actually respond to you.

8 MS. MANNER: Okay, thank you. Is there
9 anyone who would like to make a comment? And if
10 you do, I would ask that you share your name and
11 your affiliation, please. Okay. Hearing no
12 comments, I'm going to -- Thank you. Just making
13 sure. I'm going to turn the floor back over to my
14 co-chair, Charla, please.

15 MS. RATH: Great. Thank you, thank you,
16 Jennifer. And I just wanted to start with a
17 little housekeeping in terms of, you know, we're
18 in the middle of our session, and we will be
19 finishing up in December of this year. And the
20 expectation is, it's tentative, but the
21 expectation is that we'll have three more meetings
22 toward the end of the second, third, and fourth

1 quarter, to be confirmed later. But I wanted to
2 put that at least into your heads, primarily for
3 the purposes of the two subcommittees that are
4 still -- who have not yet reported out, unlike the
5 UWB committee whose work now is done -- that just
6 so you know that for planning purposes, how do you
7 move towards your draft and adoption of your
8 reports? Moving on from that --

9 MS. MANNER: Charla, we have -- Dale has
10 his hand up.

11 MS. RATH: Oh yeah sorry, Dale, I missed
12 your hand. What's up?

13 MR. ROBESON: You're on mute, Dale.

14 MR. HATFIELD: -- Yeah it's -- perhaps,
15 but I really enjoy attending the September
16 symposium and has there been a date set for that?

17 What did I say that was funny?

18 MS. MANNER: -- I'm only responding to
19 Antonio laughing, so --

20 MR. RICHARDSON: -- Well, I'm debating
21 on letting Charles speak or I speak --

22 MR. COOPER: Sure, yeah --

1 MR. RICHARDSON: But I defer to --

2 MR. COOPER: Yeah, I could take this
3 one. Hey, Dale, always a pleasure to see you.
4 Yeah, I think that this would be our 5th or 6th
5 Annual Spectrum Symposium in September, so we're
6 extremely excited about that. No date has been as
7 set yet because of price coordination, of course,
8 with a lot of parties, including where we're going
9 to host the event. But we've already started our
10 pre planning for that, and as soon as we have a
11 preliminary date, we'll be sure to socialize that.

12 MR. HATFIELD: Thank you.

13 MS. MANNER: Great, thanks. And Karl,
14 it looks like your hand is up now, too.

15 MR. NEBBIA: Yeah. The one thing I
16 wanted to ask at this point, having -- we've now
17 delivered a set of recommendations related to UWB,
18 and as I look at those recommendations, they are
19 clearly actionable in that, for instance, some of
20 them say NTIA should work with industry to do such
21 and such. Part of the issue ultimately in the
22 Federal Advisory Committee Activities is whether

1 they're also measurable. And I guess my question
2 back to NTIA at this point is, as we present these
3 recommendations, we certainly would appreciate any
4 feedback that you can give us on what we're
5 recommending, but also whether you can clarify
6 whether it's actually necessary that they be
7 worded in a way that ultimately can be counted.
8 Because I remember years back getting requests
9 from -- it was probably OMB or somebody --
10 basically asking which of the recommendations had
11 been enacted and something related to a counting
12 mechanism. So, just looking for your feedback,
13 Charles, or whoever, on as we recommend more
14 things, whether they meet your need or they have
15 to be counted or not. Because, for instance,
16 recommending that we work with industry or NTIA
17 work with industry, I'm not exactly sure how you
18 would count that ultimately.

19 MR. COOPER: Thank you, Carl. On the
20 first point with how NTIA, I think we'll take this
21 report now that it's a final form. We'll
22 absolutely be establishing a working group to see

1 which ones we can implement and which ones will be
2 appropriate and we'll be providing information
3 back to CSMAC on that. With regard to the
4 metrics, I would suggest that this kind of folds
5 into the greater NTIA FCC MOU. If you recall that
6 MOU was updated approximately the summertime of
7 last year, and we've been very encouraged by that
8 with working very closely with the FCC on
9 coordinating these items and keeping track of
10 those metrics. So, I would suggest that it's not
11 only the ultrawide band ones that come over Karl,
12 but with regard to the greater ones and
13 understanding how that MOU is being executed and
14 operationalized. I think in the next few months,
15 maybe at the one year point, I think that'll be a
16 good time for us, being the Office Spectrum
17 Management, to do an assessment of that. So,
18 thank you, Karl.

19 MR. RICHARDSON: And just to add on to
20 that Karl, yes, the reporting is to GSA. That is
21 an annual report that I do. So, yeah, some might
22 be partial, some may be full, some may not be

1 counted, but yeah, that's the reporting, or who we
2 report to.

3 MS. RATH: All right, any other
4 questions before we finish up? Great. And once
5 again, I'd like to commend the CSMAC for its hard
6 work and diligence, but I also wanted to not only
7 thank all the various committee members, but to
8 particularly thank again, we've mentioned several
9 times the NTIA liaisons who are critical to
10 keeping things on track, and they are engaged and
11 they're very helpful. And we really appreciate
12 all the help that you've been giving us to -- You
13 know, as you can see from the reports, there's
14 been a lot of work done and there's a lot of
15 behind the scenes work that's being done just to
16 help answer questions, move things along. We've
17 talked about some of it, but there's a lot that
18 goes on. So, thank you to NTIA and thank you to
19 the liaisons. And also just a thank you to the
20 UWB subcommittee who finished its work as of
21 today. So, appreciate the outstanding work and
22 how quickly it was done. So, thank you, Dennis
and

1 Paul, for leading that. But also, I attended a
2 number of those meetings and was always impressed
3 by how many of the committee members were actually
4 in attendance and how active they are. But I'll
5 say the same thing for all the committees. You're
6 just not finished your work yet, so you'll get
7 your official congratulations when we vote on your
8 reports. But again, I can't go - you know, I
9 sound like a broken record, but it has been a very
10 impressive start to this session, and I'm looking
11 forward to the next three committees reporting out
12 and giving NTIA the same sort of strong
13 recommendations that came from the UWB
14 subcommittee. So, thank you again and over to
15 you, Jennifer, for what will be the last word, I
16 think.

17 MS. MANNER: Okay, well, thank you. And
18 I second everything you said. I do want to just
19 also thank Antonio and Charles for their guidance.
20 Charla, we spent a lot of time, especially with
21 Antonio, but also with Charles, and we appreciate
22 your patience. And once again, I second what

1 Charla said. I think this is a fantastic
2 committee. And Scott, thank you for joining us
3 today. I think many of us are very excited about
4 hearing about reading the draft National Spectrum
5 Strategy, so I'm sure you'll be hearing from us in
6 our individual capacities.

7 MR. HARRIS: -- So, two things. I want
8 to pile on. I just think the work you guys are
9 doing is extraordinary. I'm new to this group, as
10 you know, and watching the work you're doing, I'm
11 just overwhelmed. It's extraordinary work, and
12 what's coming out is a request for comments, RFC.
13 The strategy hopefully will be some months down
14 the line, but you will see the RFC very soon, I
15 hope.

16 MS. MANNER: Thank you. As an FCC
17 lawyer, you have to forgive me for not having my
18 language correct, but thank you, Scott. I know
19 we're all excited for that.

20 But with that, we look forward to seeing
21 you in the working groups, and we look forward to
22 seeing you at the next CSMAC. And at least here

1 in DC, it doesn't seem to be raining right now, so
2 hopefully that will hold for the weekend. So, I
3 wish everyone a very good weekend, and thank you
4 all. And with that, we are adjourned.

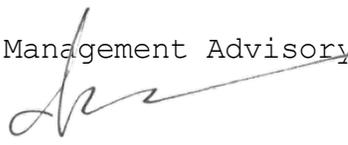
5 MR. HARRIS: Be well, everyone.

6 MS. MANNER: Thank you. Bye bye.

7 (Whereupon, at 11: 21 a.m., the
8 MEETING was adjourned.)

9 * * * * *

10 I Charla Rath and Jennifer Manner do hereby certify this
11 transcript as Co-Chair of the Commerce Spectrum
12 Management Advisory Committee.

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CERTIFICATE OF NOTARY PUBLIC

COMMONWEALTH OF VIRGINIA

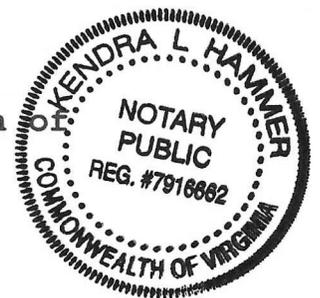
I, Kendra L. Hammer, notary public in and for the Commonwealth of Virginia, do hereby certify that the forgoing PROCEEDING was duly recorded and thereafter reduced to print under my direction; that the witnesses were sworn to tell the truth under penalty of perjury; that said transcript is a true record of the testimony given by witnesses; that I am neither counsel for, related to, nor employed by any of the parties to the action in which this proceeding was called; and, furthermore, that I am not a relative or employee of any attorney or counsel employed by the parties hereto, nor financially or otherwise interested in the outcome of this action.

Kendra L. Hammer

Notary Public, in and for the Commonwealth of Virginia

My Commission Expires: September 30, 2025

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