

UNITED STATES OF AMERICA
FEDERAL COMMUNICATIONS COMMISSION
TECHNOLOGICAL ADVISORY COUNCIL MEETING

Thursday, August 29, 2024

The advisory committee met in-person at the FCC (45 L Street NE, Washington, D.C. 20554) and via Microsoft Teams video teleconference, at 10:00 AM Eastern time, Dean Brenner, Chair, presiding.

COMMITTEE MEMBERS PRESENT:

First Name	Last Name	Company Representing
Shahid	Ahmed	NTT Ltd
Rob	Alderfer	Charter Communications, Inc.
Mark	Bayliss	Visual Link Internet
Donna	Bethea-Murphy	Viasat
Dean	Brenner	Aira Technologies
Michael	Cataletto	Scientel Solutions, LLC
Lynn	Claudy	NAB
Andrew	Clegg	Wireless Innovation Forum
Martin	Cooper	Dyna LLC
Brian	Daly	AT&T
Bill	Davenport	Cisco Systems, Inc.
Jay	Desai	Amazon
Adam	Drobot	Stealth Software Technologies, Inc.
Peter	Gammel	Ubilite, Inc.
Monisha	Ghosh	Wireless Institute, Notre Dame
Iain	Gillott	Wireless Infrastructure Association
Abhimanyu	Gosain	Northeastern University
Dick	Green	Liberty Global Corporation
Lisa	Guess	Ericsson
Sachin	Gupta	National Rural Electric Cooperative Association
David	Gurney	Motorola Solutions Inc.
Dale	Hatfield	University of Colorado at Boulder
Jason	Jackson	Kyndryl
Richard	Kessler	Marvell Technology, Inc.
Tian	Lan	George Washington University
Gregory	Lapin	ARRL
Jason	Livingood	Comcast
Dan	Mansergh	Apple Inc.
Brian	Markwalter	Consumer Technology Association

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Lynn	Merrill	NTCA - The Rural Broadband Association
Amit	Mukhopadhyay	Nokia
Jack	Nasielski	Qualcomm Incorporated
Bridget	Neville	Sirius XM Radio Inc.
Roger	Nichols	Keysight Technologies, Inc.
Madeleine	Noland	ATSC
Timothy	O'Shea	DeepSig Inc.
Bejoy	Pankajakshan	Mavenir Systems, Inc.
Jon	Peha	Metro 21, Smart Cities Institute
Robert	Rainhart	HawkEye 360, Inc.
Michael	Regan	Telecommunications Industry Association
Thomas	Sawanobori	CTIA
Henning	Schulzrinne	Columbia University
Marvin	Sirbu	Carnegie Mellon University
LiChing	Sung	NTIA
Ardavan	Tehrani	Samsung
Rikin	Thakker	NCTA - The Internet & Television Association
Michelle	Thompson	Open Research Institute, Inc.
David	Young	ATIS

COMMISSION STAFF PRESENT:

First Name	Last Name	Title
Ronald	Repasi	Chief, Office of Engineering and Technology
Martin	Doczkat	Designated Federal Officer

SUMMARY:

The advisory committee meeting began at 10:00 AM Eastern time with opening remarks from the Technological Advisory Council (TAC) Chair, Dean Brenner (Aira Technologies) with an introduction and overview of the TAC's role in guiding the FCC on telecommunications matters. The initial discussions covered WG's charter items of advanced spectrum sharing, AI/ML, and 6G technology. The TAC was also reminded of the importance of a holistic approach in formulating actionable recommendations by December 2024 and final recommendations by August 2025. A significant portion of the meeting focused on advancements and challenges in AI/ML and advanced spectrum sharing. The discussions captured the crucial role of AI/ML in enhancing telecommunications technology, particularly in network efficiency, security, and economic impacts. Other discussion topics included were AI-driven spectrum sharing, the transition from 5G to 6G, and the role of AI in network automation and performance. The meeting also delved into the future of 6G, augmented reality, and advanced spectrum sharing techniques, highlighting the U.S. government's efforts to lead in open architecture and the necessity for low latency and high reliability in future networks. Concerns were expressed regarding feasibility of meeting stringent performance and reliability standards and the impact of security vulnerabilities. The potential of full duplex communication was also discussed, with an emphasis on focusing on realistic

technological advancements. OET Chief Ron Repasi reflected on the progress made and anticipates preliminary and final recommendations by December 2024 and August 2025, respectively.

Advanced Spectrum Sharing: SS WG Co-Chair Andrew Clegg (Wireless Innovation Forum) introduced the highlights of WG's weekly meetings and progress on various charter items. The group has received presentations from external experts on spectrum sharing challenges and network topology's impact on energy efficiency. Upcoming presentations will include topics on millimeter wave sensors and coexistence challenges, which will supplement the WG's recommendations. Andrew outlined the group's approach to dividing and assigning leads for each charter item, aiming for preliminary recommendations by December 2024 and final recommendations by August 2025 noting the need to frame recommendations around these big-picture concepts, ensuring a holistic approach. The sub-working group leads provided additional updates on their progress:

- Amit Mukhopadhyay (Nokia) provided updates on charter items related to spectrum sharing frameworks and architectures, and interaction between terrestrial and non-terrestrial networks.
- David Gurney (Motorola) covered charter item number 3 on optimizing propagation models, highlighting recent discussions and presentations on clutter models.
- Thomas Sawanobori (CTIA) discussed charter item number 4 on spectrum repurposing, including case studies like the C-band and the importance of convening trusted third parties.
- Monisha Ghosh (The Wireless Institute) and Dale Hatfield (University of Colorado at Boulder) provided updates on charter item 5 regarding the state of receiver technology and its role in mitigating interference.
- Jason Jackson (Kyndryl) discussed charter items 6, 7, and 8, focusing on low-powered indoor use, sharing mechanisms, and sensor technologies.
- Rob Alderfer (Charter Communications) addressed charter item 9 on energy efficiency, emphasizing the relationship between network topology and energy consumption.
- Michael Cataletto (Scientel Solutions) and Andy Clegg (Wireless Innovation Forum) discussed charter item 10, highlighting the overlap with other items and the aim for unified recommendations.

Artificial Intelligence and Machine Learning (AI/ML): AI/ML WG Co-Chair Adam Drobot (Stealth Software Technologies) introduced the agenda, emphasizing the importance of AI/ML in telecommunications. Adam mentioned the pervasive impact of these technologies on FCC's work and the broader communication systems.

Lisa Guess (Ericsson) provided a detailed discussion on AI/ML trends: the growth of AI and softwarization, highlighting the shifting demand from consumer 5G to industry applications. Lisa covered statistics on AI's economic impact and its role in telecom efficiency, and elaborated on the economic impact of AI and 5G, mentioning new business models and challenges like security and infrastructure investments. Lisa also talked about the future of spectrum sharing, emphasizing the potential of AI in dynamic spectrum management and optimization, identifying key issues and responses, including interoperability and regulatory compliance. Lisa's presentation concluded by summarizing ongoing work in AI/ML, mentioning various working groups and standards bodies addressing these challenges.

Adam outlined the complexities of spectrum sharing, emphasizing the importance of propagation models, and discussed the role of AI/ML in resolving these complexities and improving spectrum

utilization. Adam provided an overview of the architecture of AI/ML in spectrum sharing, highlighting the need for cooperative systems and sensors, and stressed the importance of future-proof strategies for high efficiency and affordability. Adam pointed out the challenges of creating an architecture that allows modular and scalable solutions. It was also emphasized the need for a digital twin concept to ensure precise energy direction and interference prevention. Adam mentioned the importance of continuous monitoring and testing for full automation in spectrum sharing.

Richard Kessler (Marvell Technology, Inc.) introduced the topic of testing systems with AI/ML, splitting it into testing systems with AI inside and using AI to test systems. Then Richard explained the concept of digital twins and their roles in testing and optimizing communication systems. Richard highlighted the continuous life cycle of testing and monitoring enabled by digital twins. Richard also discussed the challenges of new AI architectures in communication systems, mentioning the need for new metrics like stability and resilience. Richard shifted to how AI can help test systems, providing examples like test configuration and security testing. Richard emphasized the potential of AI in generating intelligent test sequences and simulating attackers.

Ardavan Tehrani (Samsung) provided an overview of the AI landscape in the mobile industry, highlighting the collaboration between regulators, operators, vendors, and AI companies. Ardavan discussed the goals of these collaborations covering the involvement of various standard organizations and industry alliances in AI for telecom, mentioning the challenges and opportunities for smaller players in this ecosystem. Ardavan also discussed the use of AI for network efficiency and performance improvement, providing examples of current research and collaborations. Ardavan highlighted the trend toward softwarization and virtualization in telecom networks. Ardavan gave specific examples of AI applications in 6G and future telecom networks, emphasizing the significant impact of AI on reducing OPEX and CAPEX. Ardavan mentioned a need for ongoing research and collaborations with AI companies.

In summary, the WG emphasized the pervasive impact of AI across all network layers and life cycles to highlight the importance of experimentation and regulatory support to encourage innovation. The WG discussed the potential for new services and business models enabled by AI, stressing the need to monitor unintended consequences. The WG presentation concluded by inviting questions, emphasizing the importance of continuous dialogue and collaboration among industry stakeholders to address the challenges and opportunities in AI and telecommunications.

6G: 6G WG Co-Chair Brian Daly (AT&T) provided a recap of the previous TAC meeting held on June 21, 2024, and an overview of the 6G WG charter noting specific charter items that the WG has been focusing on this year: “How do openness and customization capabilities in 6G benefit supporting flexibility and agile services and its coexistence with 5G?,” “How is 6G technology envisioned to enhance or be utilized in various verticals, including autonomous driving, augmented and virtual reality, edge computing, emergency alerting, and smart cities?,” and “How will 5G/6G networks support massive volume of mobile and IoT and XR devices with low-latency and seamless connectivity for near- and non-real time, trending toward real-time applications?”

6G WG Co-Chair Abhimanyu Gosain (Northeastern University): discussed the open architectures for 6G and its key benefits, adaptability of 6G and 5G systems, focusing on software-side use cases and components swapping, providing an overview of U.S. government-led frameworks to integrate U.S. industry and government agencies around open architecture. Abhimanyu also reviewed 6G use case

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requirements for augmented and virtual reality use cases, with insights from Qualcomm on XR, and reviewed of standardization efforts in 3GPP from Release 15 and 16, focusing on energy conservation, uplink enhancements, and XR burst handling for XR/VR/AR. Abhimanyu then reviewed the full duplex technology for simultaneous in-band transmit and receive noting self-interference as a key issue and its mitigation technique by cancellation and suppression, challenges in brownfield deployments, and reviewed the key benefits of full duplex, such as increased data rates and utility in communication, and the need for further standardization. Abhimanyu concluded the presentation with a recap of the previous SME presentations, future focus areas, and the WG’s upcoming charter topics: additional SME presentations, mmWave/THz, positioning and timing, and integrated sensing and communication.

Dale Hatfield (University of Colorado at Boulder) raised concerns about 5G's reliability and vulnerability to jamming and spoofing attacks, emphasizing the need for peer-reviewed research. Brian and Abhimanyu responded to concerns, highlighting ongoing efforts to address 5G security and reliability in the context of 6G development.

Meeting Presentation Slides: <https://www.fcc.gov/sites/default/files/08-29-2024%20FCC%20TAC%20Meeting%20Slides%20Merged%20for%20Web.pdf>

Video Link: <https://www.fcc.gov/news-events/events/2024/08/technological-advisory-council-meeting-august-29-2024>

AGENDA:

10:00 am – 10:10 am	Opening Remarks
10:10 am – 10:55 am	Advanced Spectrum Sharing WG Presentation
10:55 am – 11:40 am	AI/ML WG Presentation
11:40 am – 12:25 pm	6G WG Presentation
12:25 pm – 12:30 pm	Closing Remarks
12:30 pm	Adjourned

SIGNED, COMMITTEE CHAIR

Dean Brenner

Date