



MEMORANDUM

To: Members, Energy and Commerce Committee
From: Majority Staff
Re: Communications and Technology Subcommittee Hearing

I. INTRODUCTION

On Tuesday, November 14, 2023, at 10:00 a.m., the Subcommittee on Communications and Technology will hold a hearing in 2123 Rayburn House Office Building titled “Leveraging AI to Enhance American Communications”. The following witnesses are expected to testify:

II. WITNESSES

- Ms. Courtney Lang, Vice President of Policy, Trust, Data, and Technology, The Information Technology Industry Council
- Mr. Sam Rubin, Vice President, Global Head of Operations, Unit 42, Palo Alto Networks
- Dr. Sameh Yamany, Chief Technology Officer, VIAVI Solutions
- Dr. Nicol Turner Lee, Ph.D., Senior Fellow in Governance Studies and Director, Center for Technology Innovation, Brookings Institution

III. BACKGROUND

The field of artificial intelligence (AI)—a term first used in the 1950s—has significantly evolved over past decades.¹ AI is a class of technologies that perform tasks commonly believed to require human intelligence, like decision making and inferences.² Though collectively known as AI, these technologies encompass a wide range of methodologies and modalities, such as machine learning (ML), deep learning, neural networks, robotics, machine/computer vision (image processing), and natural language processing. Advances in these areas and in the availability of large-scale data sets, have all contributed to recent progress in AI.³

These technological advancements in AI models have led to the development and widespread use of generative AI. Generative AI refers to deep-learning models, a method that

¹ John McCarthy, Computer History Museum (accessed Oct. 19, 2023), <https://computerhistory.org/profile/john-mccarthy/#:~:text=McCarthy%20coined%20the%20term%20%E2%80%9CAI.programming%20language%20lisp%20in%201958.>

² Laurie A. Harris, *Artificial Intelligence: Overview, Recent Advances, and Considerations for the 118th Congress*, Congressional Research Service (August 4, 2023), <https://www.crs.gov/reports/pdf/R47644/R47644.pdf>.

³ Laurie A. Harris, *Overview of Artificial Intelligence*, Congressional Research Service (October 24, 2017), <https://www.crs.gov/reports/pdf/IF10608/IF10608.pdf>.

teaches computers to process data in a way inspired by the human brain. The data the models are trained on to generate high-quality text, images, and other content.⁴ Examples include chatbots like OpenAI's ChatGPT, image generators like Stable Diffusion, and code generators like GitHub's Copilot. The underlying models for Generative AI tools have been described as "general-purpose AI," meaning they can be adapted to a wide range of tasks.⁵ Such advancements in AI, and its wide variety of applications, have sparked debates over appropriate uses and guardrails, including in the areas of telecommunications and technology.⁶

On October 30, President Biden issued an Executive Order (EO) to ensure that America leads the way in seizing the promise and managing the risks of artificial intelligence. The White House claims the EO will create new standards for AI safety and privacy protections, promote innovation and competition, and advance U.S. leadership in the industry.⁷

IV. Artificial Intelligence in Telecommunications

A. Networks

AI applications are being used throughout communications networks. In recent years, network operators have used AI to manage traffic, optimize network performance, and even predict potential problems before users could be affected.⁸ AI is used to monitor and automate core network functions, which some network operators have found to reduce the number of outages.⁹ Additionally, AI enables communications providers to improve customer service.¹⁰ Some providers use AI to improve the speed and quality of responses to consumer inquiries about their broadband subscriptions.¹¹

AI applications also power advancements in wireless networks and the devices to which they connect. For example, 5G and future generations of wireless networks rely on advanced computing power at the edge of the network to enable better quality of service and more efficient uses of spectrum.¹² Specifically, both the networks and devices can learn and improve upon the way they use spectrum within the unique environment where they are operating. AI applications are being used to improve how signals are transmitted off of, around, or through obstacles, known as beamforming.¹³ Additionally, advanced wireless networks use AI to improve their

⁴ Kim Martineau, *What is generative AI?*, IBM Research (April 20, 2023), <https://research.ibm.com/blog/what-is-generative-AI>.

⁵ Harris, *Artificial Intelligence*, *supra* note 2.

⁶ *Id.*

⁷ <https://www.whitehouse.gov/briefing-room/presidential-actions/2023/10/30/executive-order-on-the-safe-secure-and-trustworthy-development-and-use-of-artificial-intelligence/>.

⁸ Dean Takahashi, *Comcast credits AI software for handling the pandemic internet traffic crush*, VentureBeat (July 13, 2020), <https://venturebeat.com/business/comcast-credits-ai-software-for-handling-the-pandemic-internet-traffic-crush/>; Jeff Heynen, *AI's Impact on Broadband Networks*, Dell'Oro Group (Aug. 10, 2023), <https://www.delloro.com/ais-impact-on-broadband-networks/>.

⁹ Heyen, *supra* note 7.

¹⁰ Rose de Fremery, *How AI customer service can help enable better interactions*, Verizon (accessed Oct. 25, 2023), <https://www.verizon.com/business/resources/articles/s/how-ai-customer-service-can-help-enable-better-interactions/>.

¹¹ *Id.*

¹² Dr. Tingfang Ji, *What's the role of artificial intelligence in the future of 5G and beyond?*, Qualcomm (Sep. 20, 2021), <https://www.qualcomm.com/news/onq/2021/09/whats-role-artificial-intelligence-future-5g-and-beyond>.

¹³ *Id.*

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security by detecting patterns that suggest malicious activity.¹⁴ Implementing AI solutions into the Radio Access Network (RAN) and network core may also improve the performance of wireless broadband networks by predicting and managing changes in traffic.¹⁵ As network operators continue to define and design the networks of the future, AI applications are expected to continue to adapt.

Communications networks also leverage AI applications to prevent the scourge of robocalls. When implementing the TRACED Act, the Federal Communications Commission (FCC) permitted carriers to block certain calls, many of which utilize analytics and automated technologies.¹⁶ While these are not a comprehensive accounting of the uses of artificial intelligence by network operators, they highlight the diversity of use cases that exist. On the other hand, AI can also pose challenges, such as mimicking human voices for mass robocalls.¹⁷ On October 23, FCC Chairwoman Jessica Rosenworcel announced plans to circulate a Notice of Inquiry exploring how AI affects illegal robocalls, including protecting consumers from such calls under the Telephone Consumer Protection Act (TCPA).¹⁸

B. Satellite

Satellite communications providers are using AI applications to monitor their networks and detect troubling trends and other tasks such as avoiding collisions in space.¹⁹ They track each satellite in orbit to ensure they are operating effectively and in compliance with their license. Satellite communications services also share spectrum, which currently requires a high degree of coordination with other providers in order to avoid harmful interference.²⁰ One promising, potential use of AI in the satellite communications industry is the use of AI to manage dynamic spectrum sharing applications to improve the reuse of shared spectrum.²¹ Other potential uses include using AI to plan satellite operations and run simulations to identify what resources are needed and where.²² Finally, satellite operators utilize AI to gain insights into the large amount of Earth imaging and remote sensing data.²³ Potential applications include

¹⁴ *Id.*

¹⁵ *From reactive to proactive network operations*, Ericsson (accessed Oct. 25, 2023), <https://www.ericsson.com/en/ai/operations>.

¹⁶ “In the Matter of Advanced Methods to Target and Eliminate Unlawful Robocalls,” Declaratory Ruling and Third Further Notice of Proposed Rulemaking, Federal Communications Commission (CG Docket No. 17-59). Rel. June 7, 2019. Available at: <https://docs.fcc.gov/public/attachments/FCC-19-51A1.pdf>.

¹⁷ See, e.g., Sam Sabin, *Generative AI is making voice scams easier to believe*, Axios Codebook (Jun 13, 2023), <https://www.axios.com/2023/06/13/generative-ai-voice-scams-easier-identity-fraud>.

¹⁸ *FCC Chairwoman Launches Effort to Better Understand AI’s Impact on Robocalls and Robotexts*, Federal Communications Commission (Oct. 23, 2023), <https://docs.fcc.gov/public/attachments/DOC-397925A1.pdf>.

¹⁹ Richard Elite, *Trends and Applications of AI in Space, Via Satellite* (accessed Oct. 25, 2023), <https://interactive.satellitetoday.com/trends-and-applications-of-ai-in-space/>.

²⁰ *Id.*

²¹ *Id.*

²² Sandra Erwin, *Artificial intelligence aiding the space business across the board*, SpaceNews (Feb. 9, 2023), <https://spacenews.com/artificial-intelligence-aiding-the-space-business-across-the-board/>.

²³ Kevin Weil, *One More Way AI Can Help Us Harness One of the Most Underutilized Datasets in the World*, Planet (Mar. 21, 2023), <https://www.planet.com/pulse/one-more-way-ai-can-help-us-harness-one-of-the-most-underutilized-datasets-in-the-world/>.

identifying collapsed or raised buildings, monitoring changes in forests or farmland over time, and even tracking surveillance balloons at high altitudes.²⁴

C. Content Moderation

Many Internet platforms rely on AI to moderate content on their platforms. AI-powered content moderation allows companies to improve detection, review, and removal of content that violates laws or the platforms' terms of services at scale.²⁵ As an example, AI proactively identified 97 percent of hate speech content removed on Facebook in 2021.²⁶ Due to the volume of content posted every day, AI allows platforms to enhance the safety and quality of content on their platforms by using algorithms to detect inappropriate and harmful content before it is reported. However, there are concerns about AI-powered content moderation leading to biases and violations of First Amendment speech protections.²⁷ AI algorithms are trained on large datasets, and the algorithms are only as good as the humans that train them and their data inputs. If the humans that write the algorithm or the data used is biased or unrepresentative, the algorithms may produce biased results.

One of the key challenges in AI-powered content moderation is determining what qualifies as illegal or harmful content. AI algorithms must strike a balance between protecting users from harmful content while allowing expression protected by the First Amendment. For example, political content that is critical of a particular political ideology may be considered harmful in some contexts, but a legitimate exercise of free speech.²⁸

D. Cybersecurity

AI has revolutionized the approach to spotting cyber threats and possibly malicious activities by providing advanced techniques to detect and mitigate cyber threats. AI systems are using machine learning algorithms that can detect malware, run pattern recognition, and detect even the smallest behaviors of malware or ransomware attacks before it enters the system.²⁹

AI's ability to "learn" from previous behavior allows for rapid, actionable insights when confronted with new or unfamiliar information or behaviors. It can make logical inferences based on potentially inadequate data subsets and provide several solutions to a known problem, allowing security teams to choose the best course of action. New, generative AI can recreate human speech and writing, allowing hackers to create complex phishing attacks that were

²⁴ *Id.*

²⁵ Nafia Chowdhury, *Automated Content Moderation: A Primer*, Stanford Cyber Policy Center (Mar. 19, 2022), https://fsi-live.s3.us-west-1.amazonaws.com/s3fs-public/automated_content_moderation_a_primer.pdf.

²⁶ Guy Rosen, *Community Standards Enforcement Report, First Quarter 2021*, Meta (Mar. 19, 2021), <https://about.fb.com/news/2021/05/community-standards-enforcement-report-q1-2021/>.

²⁷ AIContentfy Team, *The role of AI in content moderation and censorship*, AIContentfy (Aug. 11, 2023), <https://aicontentfy.com/en/blog/role-of-ai-in-content-moderation-and-censorship#:~:text=In%20addition%20to%20concerns%20about,text%2C%20images%2C%20and%20videos.>

²⁸ *Id.*

²⁹ Gaurav Belani, *The Use of Artificial Intelligence in Cybersecurity: A Review*, IEEE: Computer Society (accessed Oct. 25, 2023), <https://www.computer.org/publications/tech-news/trends/the-use-of-artificial-intelligence-in-cybersecurity>.

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traditionally beyond their reach.³⁰ With the ability to identify deep fakes, malicious actors have a better capability to trick financial institutions and family members into exposing sensitive information based on their belief that the caller's identity is trusted.³¹ The most prominent response to these new AI hacking capabilities is AI empowered cybersecurity.³² Security systems that incorporate AI capabilities find impressive capabilities in the detection of malicious activities, malware detection, and proactive threat hunting.³³

V. KEY QUESTIONS

- How can companies use AI to scale business and optimize productivity?
- What challenges and opportunities does AI present for different telecommunication sections?
- How can we ensure that the datasets used to train AI are fair and protect American's data privacy?

VI. STAFF CONTACTS

If you have any questions regarding this hearing, please contact Kate O'Connor or Giulia Leganski of the Committee Staff at (202) 225-2927.

³⁰ Sam Sabin, *ChatGPT-written phishing emails are already scary good*, Axios (Oct.24, 2023), <https://www.axios.com/2023/10/24/chatgpt-written-phishing-emails>.

³¹ Roman H. Kepczyk, *Deepfakes emerge as real cybersecurity threat*, AICPA & CIMA (Sep. 28, 2022), <https://www.aicpa-cima.com/news/article/deepfakes-emerge-as-real-cybersecurity-threat>.

³² Gaurav Belani, *AI for Cybersecurity and Cybercrime: How Artificial Intelligence is Battling Itself*, IEEE: Computer Society (Sep. 6, 2023), <https://www.computer.org/publications/tech-news/trends/ai-fighting-ai>; <https://www.balbix.com/insights/artificial-intelligence-in-cybersecurity/>.

³³ *Id.*