

IISL COLLOQUIUM ON THE LAW OF OUTER SPACE (E7)
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NAVIGATING THE AI FRONTIER IN SPACE LAW AND SPECTRUM MANAGEMENT: LEGAL
CHALLENGES AND TECHNOLOGICAL SOLUTIONS

Abstract

This comprehensive presentation examines the complex relationship between AI and space law, as well as spectrum management's history and evolution in the AI era. The discussion begins with AI's legal complexities in space activities, particularly attributability and liability. AI further complicates fault assessment in space damage. The presentation highlights these challenges and discusses legal steps to reduce space asset vulnerability through AI integration to provide a more nuanced understanding.

An insightful journey through spectrum management's history from early radio communications to its current state is also presented. Spectrum policy evolves as complexity and demand for this finite resource rises. The Radio Act of 1912 and the Federal Communications Act of 1934 are used to explain the evolution from simple interference prevention to sophisticated management strategies. 5G and the IoT have increased spectrum demand and exposed limitations in traditional allocation methods, posing new challenges. The FCC's 2023 Spectrum Policy Statement and Notice of Inquiry (NOI) are critically analyzed, marking a shift toward AI-driven spectrum management. The presentation emphasizes the importance of AI and Machine Learning (ML) in managing spectrum demands as historical practices give way to data-centric ones. It examines the FCC's spectrum usage understanding, advanced data collection, and digital equity efforts. The DARPA Spectrum Collaboration Challenge and Colosseum network emulator demonstrate AI's practical applications and transformative potential in spectrum management.

In its final sections, the presentation compares the FCC's spectrum management strategy to the ITU's and national frameworks. It covers AI and ML algorithms, data analysis methods, and policy and ethical implications in spectrum management. The presentation imagines a future where AI could enable dynamic, real-time spectrum allocation, but data accuracy and overreliance on automated systems are concerns. Policymakers and stakeholders receive strategic advice at the end. It emphasizes pilot programs, research, and collaboration to use AI and data analytics for spectrum management. These recommendations balance technological advances with legal and ethical considerations to ensure a seamless, equitable, and innovative telecommunications future. This presentation discusses the challenges of integrating AI into space law and spectrum management and offers innovative solutions. Legal experts, technologists, and policymakers will discuss AI in space law and spectrum management to gain a comprehensive understanding and proactive approach.