



The rise of the machines – will AI be the death knell for traditional spectrum managers?

Conference session summary

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As the rise of AI continues, regulators are starting to explore how it could be used in spectrum management. This leads spectrum managers to consider how AI will help them with their work, and to what extent it could make them redundant. At the recent European Spectrum Management Conference¹, Aetha's Amit Nagpal and Cameron Currin moderated an interactive session titled “*The rise of the machines – will AI be the death knell for traditional spectrum managers?*” to find out the thoughts of the industry.

Potential role of AI in spectrum management

Research into AI and machine learning is a key focus of academics, and use of AI in people's daily life is on the rise. Many people will be aware of, and likely used at least once, one of the multiple chatbots and AI tools available for public use – for example, ChatGPT can be downloaded from the app store on any smartphone and is commonly used for providing help with things such as coding support.

AI chatbots could also have a role to play in spectrum management, helping prospective spectrum users to navigate the licensing process and handle customer service queries for regulators, for example. However, the potential impacts of AI on spectrum management are much broader. There are several areas of active research where AI is expected to enable major improvements. For example:

- Cognitive radio intelligence: programming and configuring radios dynamically to use the optimum channels to avoid user interference and congestion at any given moment.
- Dynamic spectrum access: existing spectrum databases make a certain level of spectrum sharing between services possible (e.g. CBRS in the USA), however AI could allow this sharing to be truly dynamic and maximise the use of highly sought-after spectrum resources.
- Interference pattern recognition: machine learning should enable the recognition of signals causing interference with the aim of removing these from the desired signals. This would increase the efficiency of spectrum use at boundaries (both frequency and geographical) between different service users – this could be particularly useful for enabling IMT to access the UHF band.

These use cases were highlighted by Saul Friedner of LS Telcom who made an introductory presentation at the conference and a poll of audience members found that most felt AI would have the biggest impact on dynamic spectrum access.

There was however little support for the idea that AI could revolutionise areas such as policy-making (e.g. during the decision-making processes of WRCs).

Potential risks of AI

In terms of the potential benefits of AI, there is no doubt that AI could bring huge upsides for the industry. However, alongside recognition of the positive impact AI could have on spectrum management, there

¹ Forum Europe, 'The 19th European Spectrum Management Conference', Brussels, 19-20 June 2024. See spectrummanagement.eu

is also an overriding sense of cautiousness as to how AI could be implemented widely across the industry whilst maintaining the necessary level of security and reliability.

Much of this apprehension stems from a perceived lack of transparency; people are inherently suspicious of 'black box' algorithms. When the AI is doing its job quietly in the background and there are no issues, people may be happy to forget these concerns. However, the issue arises when the AI does not do what people are expecting. Although it may be doing its job perfectly, there may be very little humans can do to verify its outputs as users have limited visibility of the AI's decision process.

For example, there are many widely known issues with large language models (LLMs), such as providing factually incorrect information or producing biased responses. This could be an issue in areas such as policy-making as current AI is designed to analyse and regurgitate existing information and not generate new ideas – this could lead to AI 'hallucinating' fake information to fill in the gaps in its own knowledge. The risk of AI bias within policy-making must also be eliminated before it can help create policies that are aimed at providing connectivity to all people equitably.

Therefore, for AI to succeed in the field of spectrum management, it must not only be technically capable, but also have the necessary level of transparency and trust among the industry.

Industry opinion

When getting the opinion of industry representatives at the conference, Amit Nagpal and Cameron Currin found that regulators are optimistic about the use of AI and are eager to see the outcome of research being conducted by regulators such as the FCC² and Ofcom³. Whilst concerns about trust are acknowledged, there was a general consensus that AI would bring overall benefits to the industry. It is expected that with appropriate security and data protection regulation, along with creating AI to be as transparent as possible, it will become more and more integrated into spectrum management over the coming years.

In answer to the question posed in the title of the session, "will AI be the death knell of spectrum managers?", there was little concern from the audience that their jobs would be entirely replaced by AI in the future – in a poll, only 6% of people thought that AI would make the role of human spectrum managers obsolete. This was justified by attendees for the following reasons:

- AI is far from ready to make a big impact on the industry today – it could be decades until AI plays a significant role in spectrum management.
- To maintain the trust and transparency needed from AI, human input will be required to regularly review and assess the performance of the AI.
- There was little support at the conference for the possibility of AI playing a large role in policy-making – there is no obvious way in which AI will take over this area yet, and most people believed that this would remain an area in which human control is required.

So to conclude, AI will likely make a significant impact on the way in which spectrum management is conducted in the future, however the role of human spectrum managers alongside AI will remain crucial. Conference participants can breathe easy for a while yet!

² Federal Communications Commission, 'Advancing Understanding of Non-Federal Spectrum Usage', 13 July 2023

³ Ofcom, 'Opportunities for dynamic or adaptive approaches to managing spectrum in the UK', 28 March 2023