

www.pipelinepub.com
Volume 22, Issue 12

Is Satcom Ready for AI?

By: Helen Weedon



AI has been a big talking point at every satcom conference and industry event over the last few years and there's little doubt that the technology holds great potential for the industry. While there's a lot of talk about what AI can theoretically do, it's fair to ask "How much progress is the industry making in moving from hypothesis to reality?" And, "Is the satcom industry behind or ahead of other industries in terms of adoption?" Members of the Satcom Innovations Group (SIG) recently shared their views on where the biggest potential for AI applications lies in satcom operations and its current state of adoption.

Where can AI bring most value?

Automation is probably one of the first things that comes to mind - with AI being used in areas where it will improve efficiency and reduce human error. Tasks that are repetitive, highly complex, or involve frequent decision-making tend to offer the clearest opportunities for efficiency gains and error reduction. As **Alexander Jeuck, N@SAT SINGAPORE**, says, "in principle, it should help to make satcom more reliable and more affordable, and therefore also more competitive".

Spectrum management is another obvious area where AI can make a difference. As **Erwin Greilinger, Eviden**, explains "AI can enable effective usage of available RF spectrum. In certain areas spectrum is a scarce resource and an optimised frequency planning and spectrum utilisation is needed. AI could dramatically improve the optimal usage of the available spectrum."

Jörg Rockstroh, Work Microwave, adds: "I'm convinced that all 'big data situations' offer a fantastic field in our industry where AI brings significant advancements. Be it physical channel behaviour, link availability models and predictions, network/traffic load (re-)distribution, everything that is defined by complex influences and where simplified models lose on efficiency. AI, and in particular agentic AI, is a next level tool to improve handling of these situations compared to current model-based coping mechanisms."

While **Bob Potter, Global Invacom**, sees a lot of opportunity around using AI to better analyse

© Pipeline Publishing, L.L.C. All Rights Reserved.

signals to detect interference. Rather than using conventional methods involving demodulation and signal cancelling, which involves looking inside signals to see if there is co-channel interference, Bob says “AI could be trained to analyse signals better, through carrying out quicker or more intelligent analysis based on its own learnings from signal shapes”.

Although **Najeeb Khan, Serana**, agrees that “signal characterisation is one of the prime applications that comes to mind when thinking of AI in satcom,” he sees AI as having a fundamental role above and beyond the RF path. In his view, AI will bring most value at network and operations level where it can effectively monitor and understand what is happening across a network and then decide what action to take: “The real opportunity for AI lies where humans are the bottlenecks. For example, traffic steering, where we have a self-healing network, where the network learns the normal behaviour, spots degradation and takes some sort of action, like rerouting the traffic or steering to a different satellite or orbit.”

Khan went on to explain what this could mean in practice: “If you have a payload failure at two a.m. at night, that’s usually a war room situation. But if AI could help find what the payload loading looks like, what the gateway capacity is, what the interference is, and take SLAs and contracts into account, reason about it and come up with a plan, that’s the sort of application AI enables and really brings operations to the next level.”

From the operator perspective, there is potential for AI to turn monitoring from a reactive process into a proactive one. For example, if there is a failure or interference on a transponder, an alert can be sent when levels are decreasing or a combination of different parameters. This provides advanced warning when an instance occurs, and the operator address it before customers need to be moved to other transponders.

Is Satcom lagging behind other industries?

The satellite industry’s approach to AI reflects both caution and curiosity. Some companies have waited intentionally for the technology to advance so it can be more easily adapted to meet required needs, while others point to the conservative culture and long system lifecycles that make rapid adoption difficult.

Greilinger thinks: “the satellite industry is in general a very conservative industry, with slow invention of new technologies." While Rockstroh takes a slightly different view: “Satcom and spacecom have their own life cycles and deployment constraints, which might appear slow to adjacent industries like video production, for example, but should not be confused with a lack of innovation.”

Concerns around data security and integration with existing infrastructure are also leading to a more measured pace than some other industries are moving at.

While collaboration and data sharing may help to accelerate adoption, there’s a clear tension between the potential benefits of doing this and the practical limits imposed by proprietary or sensitive information. Some companies are of course reluctant to share information at all, because of the proprietary nature of their data or the ownership of customer-generated data, while others may be open to collaboration in specific contexts, particularly where the data is less sensitive, widely observable, or could support shared goals.

There is also an awareness that remaining on the sidelines carries risks, particularly because without legacy infrastructure, new entrants into the market may be able to move forward faster. An approach that balances the urgency to adopt with caution to avoid missteps is important.

Not for distribution or reproduction.

© Pipeline Publishing, L.L.C. All Rights Reserved.

It’s recognised that there is value in looking beyond the industry for guidance. Benefit can be gained from the experience of other sectors such as telecommunications, automotive and cloud computing. All have successfully integrated AI into their systems for automation, optimisation and predictive maintenance. A systems-level approach will enable companies to move from isolated AI prototypes toward end-to-end intelligent architectures.

There’s a clear sense that the industry does need to push forward with AI but at the same time, this must be done in a cautious, measured way to avoid errors and wasted investment.

Current state of adoption

The level and speed of AI adoption varies from across the industry. While most SIG members are using generative AI in some way to make day-to-day work more efficient, the use of AI and ML in other areas of satcom is more complex.

AI can be used impactfully for a range of applications including network self-optimisation where AI dynamically adapts radio resource management in 5G/6G systems. AI-driven satellite communications where machine learning enhances beam tracking, interference mitigation and predictive maintenance provides another example. AI-powered spectrum sensing and signal classification are also becoming essential for efficient use of shared spectrum environments.

Khan points out that there is a kind of “evidence gap in AI applications” where there’s a lot of talk about what AI could do in satcom, but relatively little publicly visible evidence of AI systems being used in live commercial networks. He goes on to note that while “optimisation and intelligence work like adaptive coding and modulation are in production, those are not learnable AI systems.” Although adaptive coding and modulation technology is intelligent because it adjusts how data is transmitted according to changing conditions such as signal quality, it doesn’t necessarily learn patterns from the data and then use that learning to make predictions or decisions.

In Khan’s view, there are several reasons why learning-based AI systems are taking longer to reach production, from lack of data sharing to the market structure itself. Operator data would be extremely valuable for training AI models, but this type of data is generally considered to be commercially sensitive so it isn’t held in a publicly accessible dataset that researchers and developers can use. Alongside data scarcity, Khan sees another key barrier as being the market structure itself: “With only a handful of operators, satcom hasn't attracted the venture-scale R&D investment that other sectors have, so AI systems haven't had the runway to mature.”

Looking ahead

The message from SIG members is not that satcom needs to rush into AI, but that the industry needs to focus on where it can deliver real operational value. There are already some obvious opportunities, from predictive maintenance and interference detection through to network optimisation, spectrum management and automated decision-making. Satcom may not be adopting AI at the same pace as some other industries, but that does not necessarily mean it is falling behind. The complexity of satellite networks, their long lifecycles and the critical services they support all make a more measured approach understandable.

Some operators and vendors have already moved beyond what AI could potentially do and are implementing or developing AI tools and systems that are set to make satcom more efficient, resilient and responsive. As more applications move from theory to practical applications over the coming years, we’ll start to get a much clearer picture of how AI will shape the future of satcom.

Not for distribution or reproduction.

© Pipeline Publishing, L.L.C. All Rights Reserved.