The future of Tactical Data Link technology: meeting battlefield challenges in 2023, and beyond

Jackson White, Business Development Director of Tactical Data Links and VP Marketing, SPX CommTech, discusses the development of Tactical Data Link (TDL) technology in enabling more secure and reliable data transfer between aircraft and ground teams for effective real-time ISR

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Q: Firstly, tell us what are Tactical Data Links, and why do they matter?
A: Remote sensors are playing an increasingly crucial role in modern warfare. They're critical for Intelligence, Surveillance, and Reconnaissance (ISR) as they can transmit real-time live, high-quality video, radar and audio data. This enables operations to be executed extremely quickly by speeding up intelligence dissemination and allowing a faster decision-making process, which significantly aids in a range of situations from supporting civil authorities and governments in several types of operations.

Accurate, real-time sensor intelligence relies on Tactical Data Links that enable the fast and seamless exchange of mission-critical situational data between platforms, such as fixed and rotary wing aircraft and decision-makers in static or fixed command centres. Data fusion combines real-time data from multiple sources to provide a more accurate and consistent view of the operational picture, allowing more informed, quicker decisions and increased command and control capabilities in ever-evolving situations.

Q: How has Tactical Data Link technology developed in recent times?
A: Tactical Data Link technology is constantly developing to keep pace with the vast amounts of data being created by operational sensors. For instance small, lightweight, low-power and high-performance Data Links are allowing users the ability to transmit data further from their ISR capabilities to the point of use. When integrated into an unmanned system such as a drone, they can cost-effectively carry out ISR missions in air, sea or on land domain, over extreme ranges of up to 200 kilometres without the use of satellites.

High data throughput and long-range links benefit from Software Defined Radio (SDR) technology, enabling the maintenance of the robust long-range connection with rapid re-gain of the link, whilst incorporating a number of different waveforms. Depending on the concept of operations and the defined user case, teams may be able to reconfigure the radio capability from a mesh capability to a "point to point-line-of-sight" long-range capability – all on the same platform.

Over the last 12 months, we've also seen technology enhancements that impact performance in operational use. We have witnessed improvements in the technology that encodes and decodes video, audio and IP data, which allow for the transfer of multiple high-quality videos to provide more detailed video intelligence for a more informed decision-making capability. These improvements create marginal gains that really matter.

Q: How are operational users and teams deploying TDLs?
A: Equipping users with the latest technology has been, and will continue to be, crucial to the success of ISR operations. As the operational environment becomes more RF complex, the way users work with others becomes more complex too. For instance, ISR is used by a number of agencies, from military to government and civil security organisations, who increasingly work together to share information either for inter-agency, or siloed operations. Each user or team has its own independent data exchange requirement, which must remain encrypted and only accessible to those that need access to it. Therefore, compartmentalising data allows each to access only the data required for their operation, while everything else remains encrypted and inaccessible for viewing. Intelligence analysis often requires the ability to share information securely, especially where such large volumes of data are transferred in real-time. When it comes to Data Links, data throughput can become vulnerable to attacks as the demands from sensors grow. Highly secure, robust Data Link technology can mitigate this and ensure data security using sophisticated embedded encryption algorithms.

Operational users are also incorporating Data Link systems into more multi-role platforms. Until recently, Data Links have mainly been seen on fixed and rotary-wing aircraft, which have been used in individual roles such as troop transportation, combat search and rescue or ISR. We're now seeing aircraft being designed to be multi rolled, which is leading to platform integrators and OEMs designing solutions that can incorporate ISR mission systems installed across all platforms – with the ability to carry on, or rapidly mount and dismount. This ultimately gives users flexibility when deploying ISR assets. The ability to reconfigure platforms significantly reduces the burden on platform availability and these same platforms can be effectively repurposed and deployed for the most pressing operations.

Q: How have conflicts, including the Russia-Ukraine war, influenced the use of TDL technology?
A: The conflict in Ukraine has led to a sense of unease across eastern and northern Europe and has put border security to the top of the security agenda. With cross border incursions and mass migration from Ukraine to boarding countries, keeping borders safe is of utmost importance. As a result, we've seen more ISR assets placed for border surveillance over the past few months. It's through this ISR deployment that we're witnessing more effective security and surveillance control across Europe.