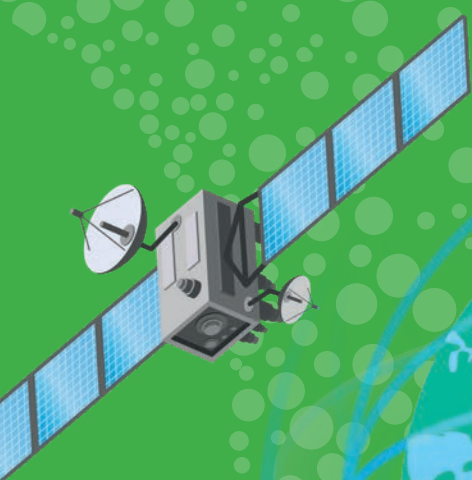


FROM THE INDUSTRY

A New Era for Satcom:

THE RISE OF MULTI-ORBIT
NETWORKS AND SOFTWARE-
DEFINED GROUND SYSTEMS

BY DON CLAUSSEN, CEO OF ST ENGINEERING IDIRECT.



SATELLITE COMMUNICATIONS MUST EVOLVE FROM TRADITIONAL SINGLE-ORBIT NETWORKS WITH RIGID GROUND SYSTEMS, TO FLEXIBLE GROUND SYSTEMS THAT AMPLIFY THE ADVANTAGES OF A MULTI-ORBIT SPACE SEGMENT AND INTEGRATE WITH THE STANDARDS BASED GLOBAL TELECOMS ENVIRONMENT.



Today's users demand speed, adaptability and always-available performance. Static infrastructure can't meet these demands, but multi-orbit architectures and software-defined ground systems can. They're quickly becoming the new baseline. This shift is fundamental. SATCOM is no longer a niche solution or redundancy option. It has become a critical part of the global connectivity fabric alongside terrestrial networks.

For our industry to keep pace and remain relevant, we must discard our legacy lexicon and embrace a new one defined by flexibility, interoperability and integration.

THE FUTURE OF MULTI-ORBIT NETWORKS

The satellite industry is evolving rapidly, and the move to multi-orbit architectures marks one of the most significant shifts we've seen. For decades, Geostationary Earth Orbit (GEO) satellites served as the backbone of traditional communications, while Low Earth Orbit (LEO) satellites carved out specialised roles for unique applications. Today, the conversation is no longer about GEO versus LEO or latency alone. It's about combining multiple orbits into cohesive application-driven networks.

Each orbit brings unique strengths to the table. The real value lies not in choosing one over the other, but in hybrid solutions that capitalise on the strengths of each orbit, providing a high degree of flexibility.

Multi-orbit systems offer powerful capabilities, but they also introduce complexity. Managing multiple orbits creates an orchestration challenge. Without unified intelligent systems to facilitate seamless handoffs and dynamic resource allocation, the promise of multi-orbit connectivity risks being derailed by operational inefficiency.

We've embraced this challenge head-on with innovations such as our satellite switching algorithm, which has already proven its value in the Arctic by enabling modems to switch seamlessly between GEO and Highly Elliptical Orbit (HEO) satellites. This capability extends coverage, enhances reliability and brings us closer to a future where inter-provider and cross-platform roaming ensures uninterrupted connectivity for the end user.

Importantly, the evolution toward multi-orbit is also driving collaboration across the industry. By aligning with open standards

and building an integrated ecosystem, we're laying the groundwork for seamless roaming across terrestrial and satellite networks. This level of interoperability is critical to making connectivity effortless, enabling enterprises and consumers alike to focus on results rather than architectures.

The industry is still in the early stages of fully realising the potential of multi-orbit systems, but the trajectory is clear. Operators who prioritise adaptability, resiliency and innovation today will be setting tomorrow's standards.

INNOVATION FROM THE GROUND UP

Space assets have evolved dramatically in recent years, with satellites now capable of real-time adjustments to coverage, capacity and functionality. But ground systems, in many cases have lagged, stuck in rigid, hardware-bound architectures that stifle adaptability.

We believe this demands a radical reinvention of the ground segment. The future lies in systems that are fully virtualised, cloud-native and software-defined. These intelligent networks are not simply reactive; they're proactive. They allocate network resources dynamically and optimise performance in real time.

For instance, our Intuition Ground System was designed to address these exact needs. Its advanced orchestration capabilities don't just support multi-orbit configurations but actively manage the dynamic allocation of resources between satellites and terrestrial links. This ensures that operational efficiency, quality of service (QoS), and network resilience scale along with demand.

AI-driven automation is a central pillar of this transformation. AI systems in real-time traffic management are already demonstrating their ability to prioritise application needs dynamically, whether for seamless gaming experiences during a flight, or critical IoT data transfers on the ground. Through proof-of-concept demonstrations, we have shown how AI can spot potential network issues before they become a problem, preventing downtime and ensuring continuity.

THE POWER OF INTEGRATION AND COLLABORATION

Historically, the satellite industry has operated within silos, disconnected from the broader telecommunications

ecosystem. This approach has held us back, but we see that changing with the adoption of shared standards and open collaboration.

Standards like 3GPP and DIFI (Digital Intermediate Frequency Interoperability) are paving the way for greater integration and interoperability between satellite and terrestrial networks. With 3GPP Release 17 supporting Non-Terrestrial Networks (NTN) and the promise of Release 18 further expanding satellite connectivity, the foundation is in place to unify diverse ecosystems.

The DIFI Consortium, where we play an active role, helps operators replace hardware-heavy gateways with software-defined solutions. By adopting these open standards, operators gain flexibility, unlock the power of cloud-scale operations and deliver consistent performance across technological boundaries.

This ecosystem-driven approach extends the viability of multi-access networks, opening opportunities for hybrid roaming and best-path routing where decisions about traffic flow are optimised across GEO, LEO, MEO and terrestrial networks.

THE FUTURE IS FLEXIBLE, INTELLIGENT AND ORBIT-AGNOSTIC

Today, the satellite communications industry stands at a crossroads. Multi-orbit architectures and software-defined ground systems are not just upgrades – they represent a complete redefinition of how SATCOM fits into global connectivity.

From supporting remote enterprises to bridging coverage gaps in the Arctic, we've seen first-hand the opportunities that integrated systems unlock. But to fully realise this future, the industry must continue investing in scalable, standards-driven and interoperable infrastructures to meet the needs of a fast-moving, connected world.

For operators and providers, the call to action is clear. Those who invest now in innovation will secure their leadership in this new multi-orbit era. For our part, at ST Engineering iDirect, we're committed to leading the way by breaking down barriers, adopting new technologies and shaping a future where SATCOM is indispensable. The opportunity is here, and the moment to act is now.

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