Gilat Defense

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White Paper

Modem Technology Modernization for Mission-Critical SATCOM

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Executive Summary

Modern military operations rely on resilient, secure, and high-throughput communications across increasingly complex and contested environments. As operational speed accelerates and data demands intensify, it becomes clear that legacy SATCOM modem architectures were not designed for today's scale, multi-orbit flexibility, and dynamic mission requirements.

Gilat is advancing modem technology to meet these evolving defense requirements, delivering multi-orbit, software-defined, and mission-ready platforms that enable scalable, secure, and high-performance communications. With four decades of experience in satellite modem innovation, Gilat combines deep technical expertise with a forward-looking approach aligned to future standards, including 5G non-terrestrial networks, and a diversified modem portfolio designed to address a wide range of form factors, performance requirements, and operational applications.

The Shift from Legacy Architectures to Scalable Defense Networks

The modern battlespace is defined by distributed forces, the need for real-time situational awareness, and increasing reliance on data-intensive applications such as ISR, sensor fusion, and command-and-control systems. These capabilities depend on continuous connectivity across multiple domains and operational environments.

Legacy SATCOM architectures, built primarily around point-to-point links, were not designed to support the scale and operational complexity now required. As deployments expand and forces operate across multiple theaters, communications networks must evolve toward more flexible and resilient models.

This shift is driven by several core operational requirements:

- Support for **large-scale, distributed deployments** with thousands of terminals
- Seamless **multi-orbit connectivity** across GEO, MEO, and LEO
- **Low latency and high throughput** for time-sensitive applications
- **Resilience in contested environments**, including interference and jamming
- **Interoperability across coalition forces and legacy systems**

Meeting these demands requires a transition to multi-access, dynamically managed network architectures capable of maintaining performance and continuity under operational stress.

Legacy airborne SATCOM systems often create tradeoffs between performance, size, weight, power, and coverage. Orbit-specific or mechanically steered solutions can limit mission agility, increase maintenance burden, and complicate fleet integration. For unmanned platforms in particular, the ability to maintain secure BLoS connectivity with low latency and high reliability is mission critical.

Gilat's Approach to Defense Modem Modernization

Gilat's modem modernization strategy is based on deep expertise across core technologies, combined with alignment to emerging industry and defense standards. This approach ensures that performance, security, and upgradeability are consistently maintained, while enabling seamless integration with broader operational ecosystems.

The evolution of Gilat's modem portfolio is focused on enabling multi-orbit operation, increasing flexibility through software-defined capabilities, and sustaining performance at scale. The architecture is also designed to support migration toward 5G NTN frameworks, ensuring long-term relevance as defense networks evolve.

This balance between in-house expertise and standards alignment enables defense organizations to adopt new capabilities while maintaining operational flexibility and continuity.

Scaling Communications for the Modern Battlespace

As operations become more distributed, SATCOM networks must support significantly higher numbers of terminals while maintaining consistent performance. This requires moving away from rigid, capacity-limited systems toward architectures that can scale dynamically based on mission needs.

Gilat's modem technologies are designed to enable efficient multi-access operation, optimized bandwidth utilization, and dynamic resource allocation. These capabilities ensure consistent performance even in high-density environments, while allowing networks to adapt to changing operational requirements without structural redesign.

This scalability is essential for supporting both current deployments and future expansion as data demands continue to grow.

SkyEdge IV Platform and Advanced Modem Portfolio

SkyEdge IV is Gilat's next-generation software-defined ground segment platform. The SkyEdge IV architecture supports capabilities often required in defense and government satcom networks, including multi-orbit operation, resilient capacity management, secure access, mobility support, redundance and centeralized network control.

As defense operations increasingl span multiple domains and satellie environments, SkyEdge IV provides a unified ground segment platform that can support fixed infrastructure, mobile forces and changing mission demands. The platform helps users, including thos operating in givernment and security environments, to deploy and operation satellite networks with availability, protection, redundancy, diversity and embedded cybersecurity as operational condistion, locastion and space assets evolve.Building on this platform, Gilat's modem portfolio is designed to address a wide range of operational requirements, from high-

throughput communications to flexible, interoperable deployments across different mission profiles, form factors, and performance needs.

Together, these platform capabilities are supported by a modem portfolio that addresses different deployment models, performance levels, and integration requirements.

The **Aquarius Pro DS modem** is engineered for high-capacity environments where consistent, high-speed performance is critical. Designed to support SCPC and star network architectures, it enables multi-orbit operation and delivers the throughput required for demanding applications such as ISR, video transmission, and real-time data exchange. Its ability to sustain high data rates in challenging conditions makes it well suited for mission-critical operations requiring continuous connectivity.

The **GLT-1500 SDR modem**, available in card and rack mount configurations, provides a flexible, software-defined foundation for interoperability and long-term adaptability. By enabling multiple waveforms within a single platform, it supports both point-to-point and network-based architectures while allowing systems to evolve over time without hardware replacement. This approach enables forces to adapt to changing mission requirements, maintain compatibility with existing and allied systems, and incorporate future waveform developments through software-based updates.

The **GLT 2000 modem** is a ruggedized next-generation SDR satellite modem for military and government missions that require secure, resilient, and high-throughput communications. Combining GLT-1500 performance and waveform flexibility with battle-proven durability, it supports reliable on-the-move and on-the-pause connectivity across land, sea, and air. Its compact, low SWaP design supports robust BLoS communications, mission-critical data exchange, and dependable operation in harsh and contested environments.

The **Taurus Mini Card** provides a compact embedded satellite modem card based on Gilat's proven Taurus technology, designed for integration into customer-specific enclosures and size-constrained platforms. It delivers high-availability, high-speed connectivity for fixed and mobility applications, with a small footprint and low power consumption. Supporting SkyEdge II-c and SkyEdge IV, it enables IP data, voice, and video services over HTS, VHTS, and wide-beam networks.

Security in Contested Environments

Defense SATCOM networks must operate in environments where communications are intentionally disrupted and targeted. Ensuring the confidentiality, integrity, and availability of data is therefore essential.

Gilat modem platforms are designed with integrated security capabilities, including advanced encryption, transmission security mechanisms, and protections against unauthorized access or tampering. These capabilities are embedded within the architecture to ensure that communications remain secure and reliable even under operational pressure.

This approach supports mission continuity and helps maintain the integrity of critical communications links across all phases of operation.

Evolution Toward 5G NTN

Satellite communications are increasingly aligning with 5G non-terrestrial network standards, creating new opportunities for interoperability and more efficient use of widely adopted technologies.

Gilat's modem architecture supports an evolution path toward cloud, digital interfaces, and 5G NTN as standards and deployments mature. This transition through virtualization and software-based functionality allows for gradual adoption of 5G NTN capabilities without requiring significant hardware changes. As a result, defense organizations can integrate new technologies while maintaining continuity of existing systems.

This evolution also enables greater flexibility in network design and supports long-term modernization strategies across defense communications infrastructures.

Conclusion

Modern defense operations place increasing demands on SATCOM networks, requiring systems that can scale, adapt, and perform reliably in complex environments.

Gilat's modem modernization approach addresses these requirements through multi-orbit capability, software-defined flexibility, and high-performance architectures designed for mission-critical applications. This enables defense organizations to deploy communications networks that are resilient, interoperable, and ready to evolve alongside future technologies.

About Gilat Defense

Gilat Defense delivers secure, rapid-deployment solutions and battlefield connectivity, with support for multi-orbit and multi-constellation networks. These capabilities ensure reliable communications beyond line of sight, in remote locations, on the move, and in the most demanding operational environments. For more information visit www.gilat.com.