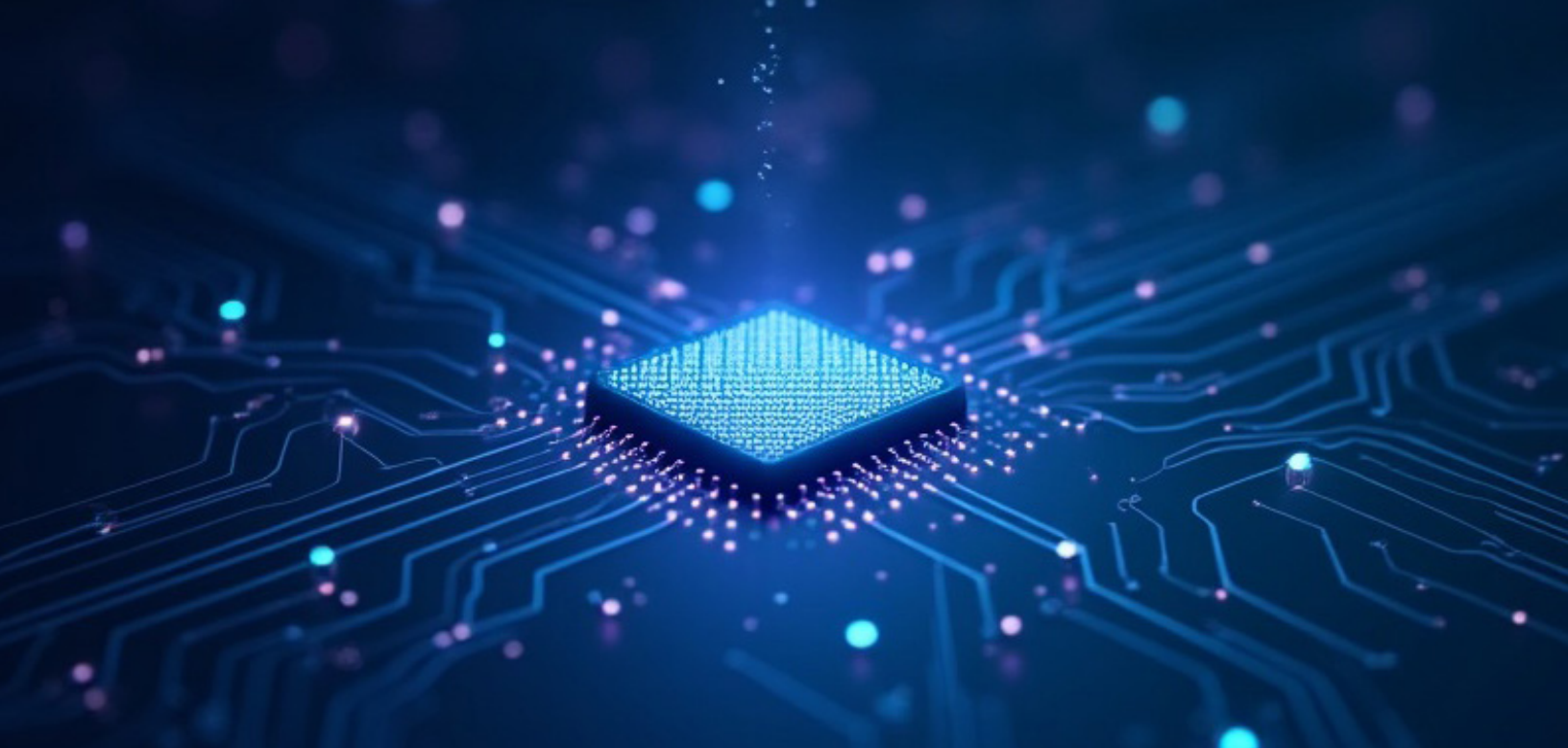# Futurum
R E S E A R C H

QUALINX

Qualinx Dragonfly is Transforming Connectivity

Dragonfly: The Future of Tracking Solutions

As wireless connectivity expands across industries, from smart cities and wearables to next-generation IoT, conventional RF design has reached its limits. Analog-heavy architectures, while foundational, struggle to meet the flexibility, scalability, and low power requirements for battery-powered devices necessitating new designs with every change in communications technology.

Qualinx's adoption of Digital Radio Frequency (DRF) technology, embodied in its Dragonfly™ brand, represents a transformative shift in design. By replacing traditional analog circuit functions with scalable digital equivalents, Dragonfly™ enables ultra-low power consumption, simplified architectures, and native multi-protocol support. This breakthrough, powered by advanced CMOS integration, lays the groundwork for significant advancements in connectivity, intelligent devices, and system-level integration.

Reconfigurability: By digitizing RF signal processing, DRF systems can be more easily reconfigured via software, ensuring flexibility. This means a single chip can support multiple wireless standards (e.g., GPS, WiFi, LTE-M, or custom protocols) without requiring dedicated analog hardware for each. This adaptability allows manufacturers in many different sectors to collapse multiple dedicated radios into one that can be fully reconfigured on the fly.

Shorter development cycles: Instead of painstakingly designing an entire analog front-end, it's now possible to lay out with a single chip and dramatically minimizing the external bill of material (BOM) while supporting standardized toolchains for design and optimization.

Resilience & Signal Integrity: Dragonfly™ allows for the direct application of digital signal processing to RF signals, boosting interference rejection and anti-jamming capabilities. This ensures reliable communication even in congested or adversarial spectrum environments.

Power Efficiency: Dragonfly™ offers a dramatic leap in improving energy efficiency, delivering up to 10x lower power consumption compared to conventional RF chips. This is a catalyst for ultra-compact, battery-friendly devices in wearables, IoT, and telecom.

Cost Efficiency at Scale: Leveraging CMOS and minimizing bespoke analog components drives down production costs. This positions DRF as a scalable solution for mass-market devices like smart trackers, asset sensors, and embedded communication modules.

Process Node Scalability: Unlike analog circuits, digital RF scales seamlessly with semiconductor node shrinkage (e.g., 5nm, 3nm). Designs based on Dragonfly™ benefit directly from advances in the semiconductor industry, gaining speed and efficiency with each new generation.

Figure 1: Benefits of Digital RF

Redefining GNSS with - Power, Performance and Form factor

Performance

20mW

Up to

2-5 x

25mm²

Power required

2-5mW

1 x

Form factor

7.5 mm²
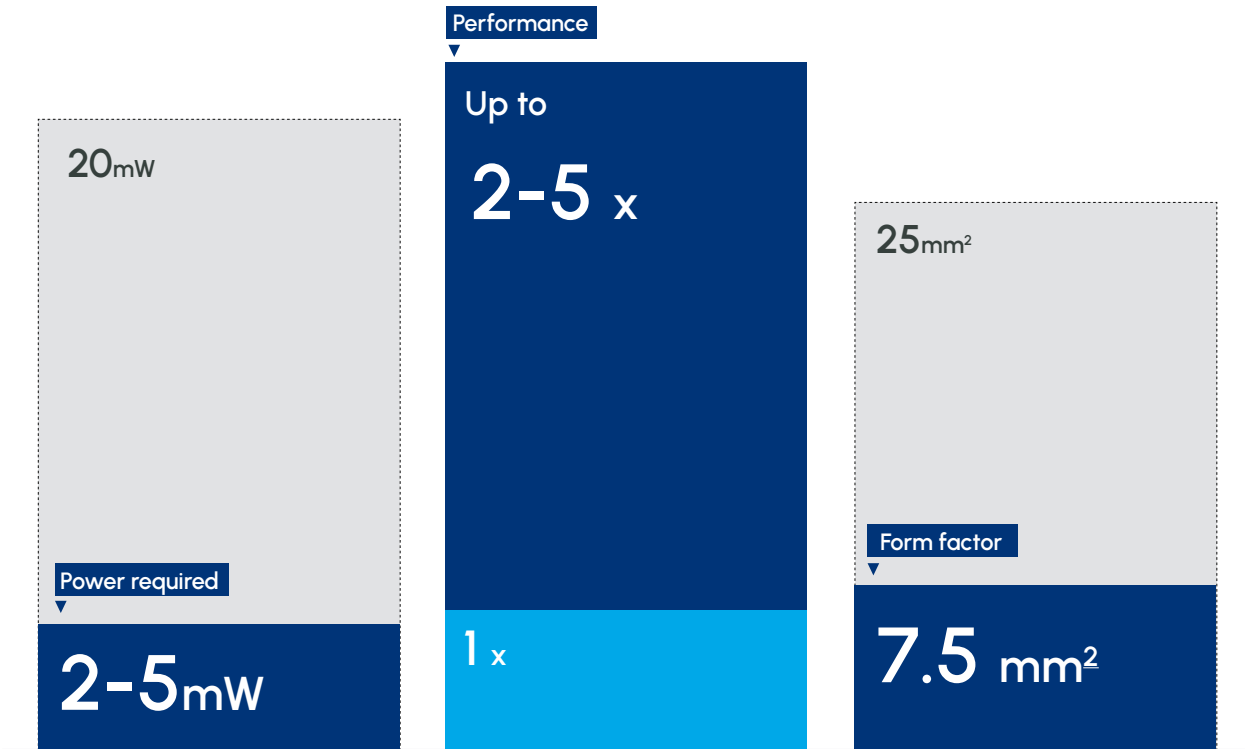
Source: Qualinx

Top Emerging Use Cases Ready for Qualinx Dragonfly™

The innovative breakthroughs offered by Qualinx DRF technology accord with major emerging use cases ready to take advantage of competitive benefits such as substantial power efficiency and scalability gains, versatile programmability, streamlined design, performance advances, and decreased costs. Such use cases include:

Wearables: The QLX3Gx, a dual-band GNSS receiver based on Dragonfly™ technology, can operate with up to 10 times less energy compared to traditional solutions. Knowing that over 50% of power consumption in wearables is linked to positioning, a typical recharge time of 3 days can be extended to over 2 weeks, a considerable advantage for small –battery-constrained devices.

Secondly, the small form-factor of the QLX3Gx, positioned amongst the smallest form-factors available, and the reduced BOM count help in enabling sleek, lightweight designs without sacrificing performance.

Smart Cities: The QLX3Gx, based on Dragonfly™ technology, is particularly well-suited for smart city infrastructure thanks to its ultra-low-power operation and robust performance in dense signal environments. Parking sensors, for instance, can stay active for years on a single battery, eliminating the need for regular maintenance. This is possible due to power consumption levels up to 10 times lower than conventional GNSS receivers.

In busy urban environments, where interference from grid equipment and consumer devices is common, QLX3Gx's advanced interference mitigation dynamically notches out problematic frequencies, ensuring uninterrupted operation. Furthermore, the receiver's ability to switch between low-power and continuous tracking modes allows installations like traffic counters, smart waste bins, or environmental monitoring stations to adjust their power use based on real-time demand, remaining online without frequent servicing. This balance of resiliency and energy efficiency makes mass-scale city deployments more viable both economically and technically.

Asset Tracking: Qualinx chips, such as the QLX3Gx, support all GNSS constellations, including GPS, Galileo, GLONASS, and BeiDou on both bands. This makes them ideal for asset tracking applications, offering precise, real-time positioning for everything from shipping containers to high-value equipment. This can be rendered more secure and resilient to spoofing by enabling OSNMA on Galileo receivers - a feature developed in close collaboration with EUSPA.

IoT Devices and Wireless Technologies: IoT devices often operate under tight energy constraints, especially when deployed in remote or hard-to-access locations. The QLX3Gx, engineered with Qualinx's Dragonfly™ technology, empowers these systems to function for months or even years without battery replacement. This makes it an ideal fit for agricultural sensors, pipeline monitors, and infrastructure nodes where reliability and longevity are essential.

Moreover, the chip's multi-protocol adaptability means a single device can operate across Bluetooth, Wi-Fi, LPWAN (such as LoRa or NB-IoT), and even 5G, depending on the application. A smart sensor might use Wi-Fi for high-bandwidth local data transfer, LPWAN for periodic long-distance reporting, or switch to 5G for real-time camera feeds — all on the same hardware. This consolidated approach reduces SKU complexity, simplifies development cycles, and accelerates deployment timelines across broad and diverse IoT networks.

Commercial Success on the Horizon - Qualinx's Expanding Market Reach

Surging Market Demands

Industries are undergoing rapid transformation, driven by growing demands for efficiency, intelligence, and sustainability. This evolution is fueled by an increasing need for technologies that can seamlessly blend human-machine interactions, environmental awareness, and operational performance. At the forefront of this shift is the surging global demand for low-power, high-performance solutions across GNSS, IoT, and wireless connectivity ecosystems.

Precise GNSS capabilities are becoming an operational necessity in sectors like logistics and autonomous mobility, while robust wireless communication is essential to the success of 5G networks, smart infrastructure, and industrial automation. These trends are accelerating the adoption of highly integrated, energy-efficient components that can deliver real-time data with minimal power usage.

The scale of this momentum is illustrated by market forecasts: the global IoT market alone is projected to grow at a CAGR of 14.1%, expanding from USD 1,425.58 billion in 2023 to over USD 5.3 trillion by 2034 (Allied Market Research[1]). In parallel, GNSS and wireless communication technologies are seeing exponential growth, especially in applications like smart cities, connected factories, and next-generation vehicles, further validating the need for compact, general-purpose radio solutions.

Scalability

Delivering at scale demands technology that combines high performance with innate scalability and cost-efficiency. Dragonfly™ acts as a dual-purpose enabler, seamlessly aligned with advanced digital fabrication protocols. It facilitates compact SoC integration without relying on proprietary or high-cost production techniques, while at the same time opening up considerable room for future functional innovation driven by small-scale manufacturing cycles.

Take the QLX3Gx, for instance: it exemplifies how Qualinx's commitment to die-size optimization yields tangible benefits in production. By minimizing die dimensions, more chips can be harvested per wafer, trimming down material costs and boosting throughput per fabrication run. As demand climbs, Qualinx maintains the agility to scale output while preserving delivery speed and economic viability.

This scalability edge empowers Qualinx to effectively handle both agile, localized deployments and expansive global implementations, crucial for meeting the varied requirements of industrial, consumer, and infrastructure ecosystems.

1. https://www.alliedmarketresearch.com/internet-of-things-IoT-market

Business Potential

Qualinx's modular, silicon-proven technology is built to integrate directly into existing CMOS manufacturing flows. This design philosophy not only accelerates go-to-market timelines but also enhances supply chain reliability by aligning with well-established semiconductor foundry processes.

From a business development perspective, Qualinx enables other industry leaders to extend their market offerings. Top-tier RF and IoT chipmakers can integrate Qualinx's Dragonfly™ technology into their platforms, tapping into new or existing verticals, including automotive telematics, industrial IoT, and energy-efficient consumer electronics more efficiently.

Figure 2: GNSS Devices Volume 2023-2033
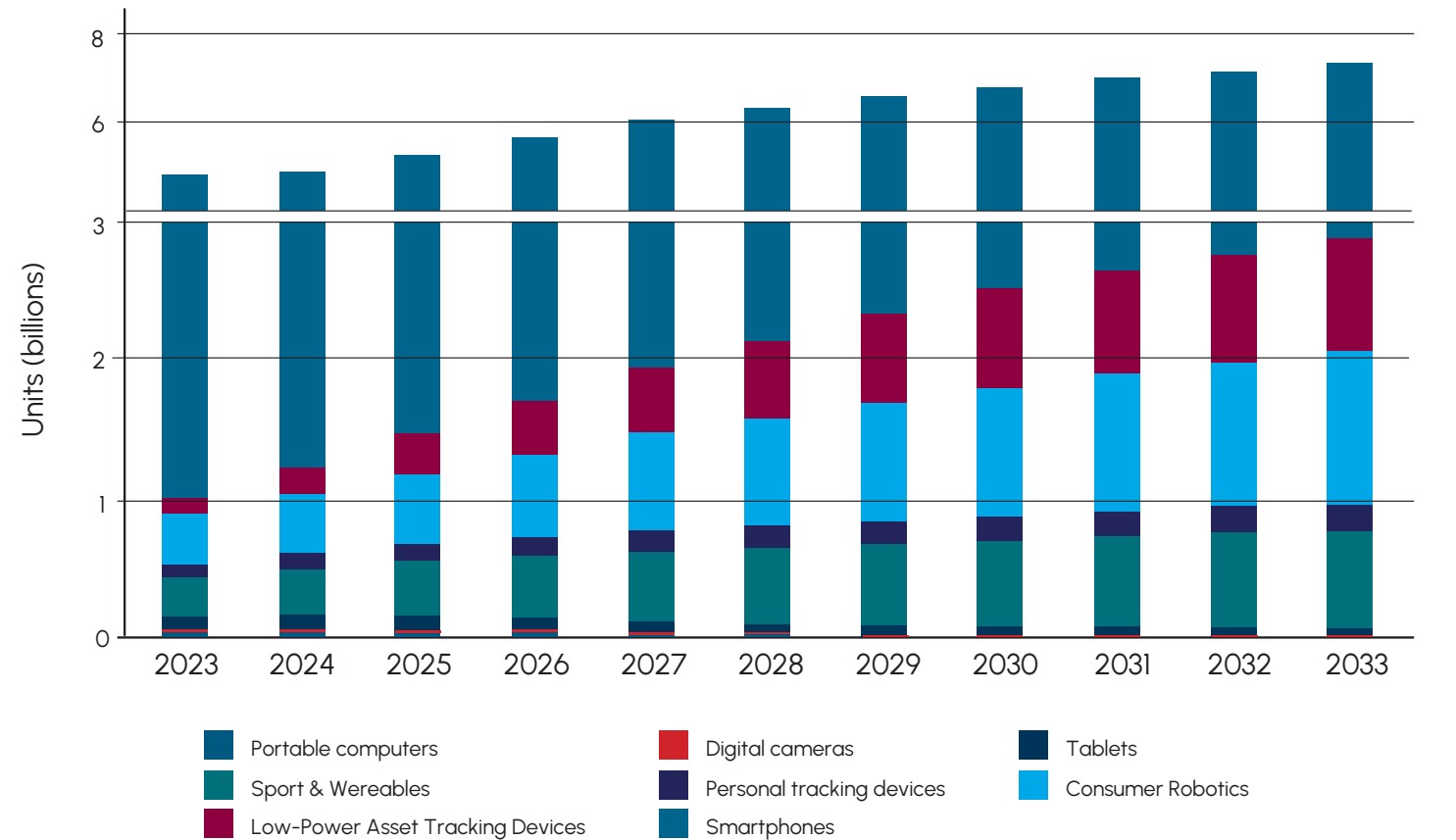
Such cross-industry compatibility expands Qualinx's commercial footprint while building strategic alignment with global technology partners. Whether it's enabling the next wave of smart mobility or powering critical infrastructure sensors, Qualinx offers a technology foundation with high adaptability and proven commercial upside.

The advantages of Qualinx's products, like flexible reconfiguration and ultra-low power use, make them well-suited for a myriad of products, such as wearables, asset trackers, health trackers, or building sensors, aligning with the needs of manufacturers. For example, these players can embed Qualinx chips in smartwatches or medical trackers, offering longer battery life, more precise location, or a mix, eventually resulting in better customer satisfaction across diverse and intensely competitive markets.

What's Ahead for Qualinx

The convergence of the IoT and GNSS markets is reshaping how devices interact with the physical world, unlocking new levels of efficiency, automation, and intelligence across industries. As IoT devices become more pervasive, the demand for precise positioning and timing has surged, making GNSS a critical component in a vast majority of connected solutions. From smart logistics and fleet management to agricultural automation and infrastructure monitoring, reliable location data is foundational. In essence, today's smart devices not only need to be connected—they need to know exactly where they are, and when. This tight coupling of connectivity and geolocation is driving innovation in integrated chipsets and end-to-end platforms combining GNSS with low-power wireless communication.
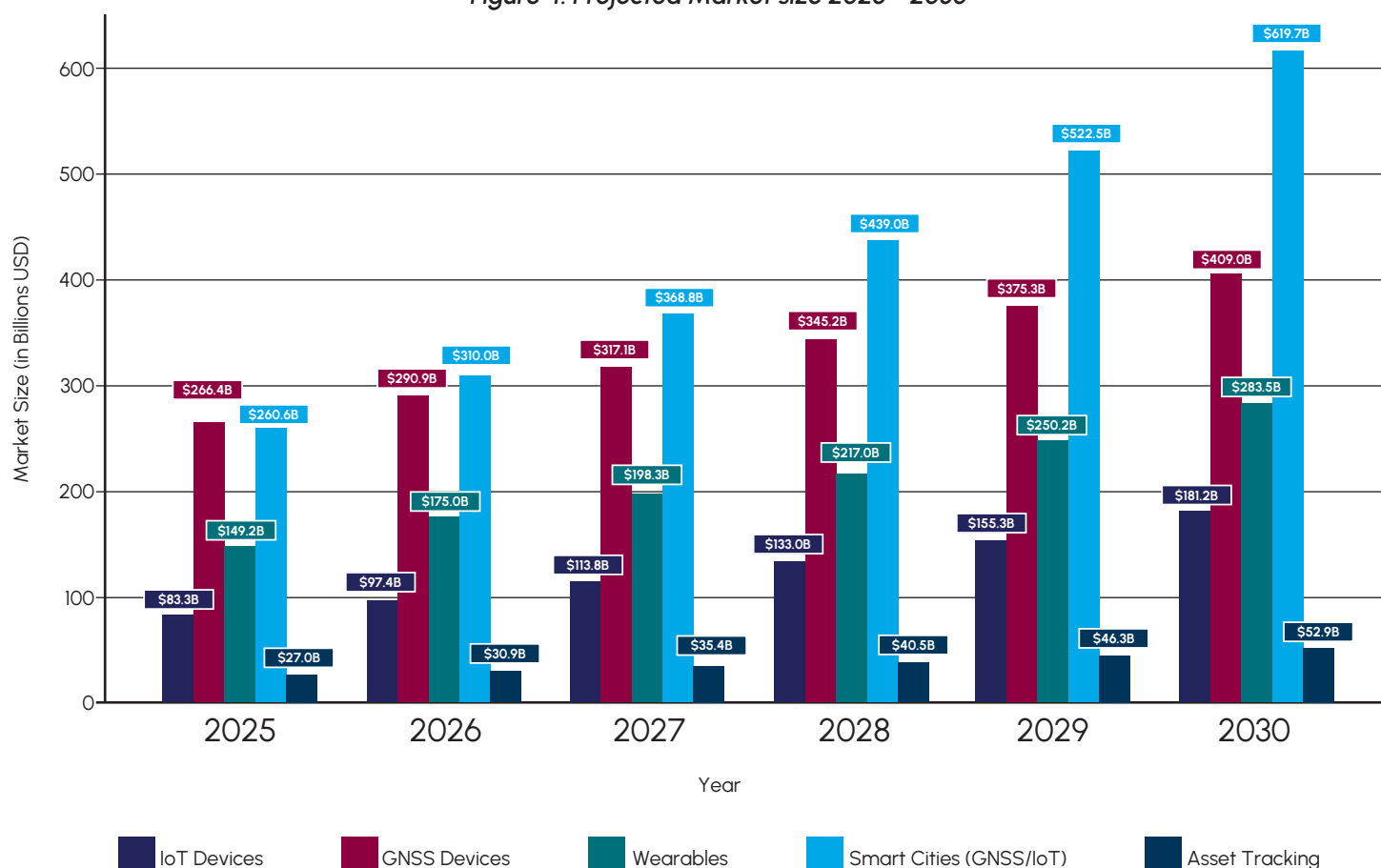
Figure 3. Total of GNSS and IOT markets
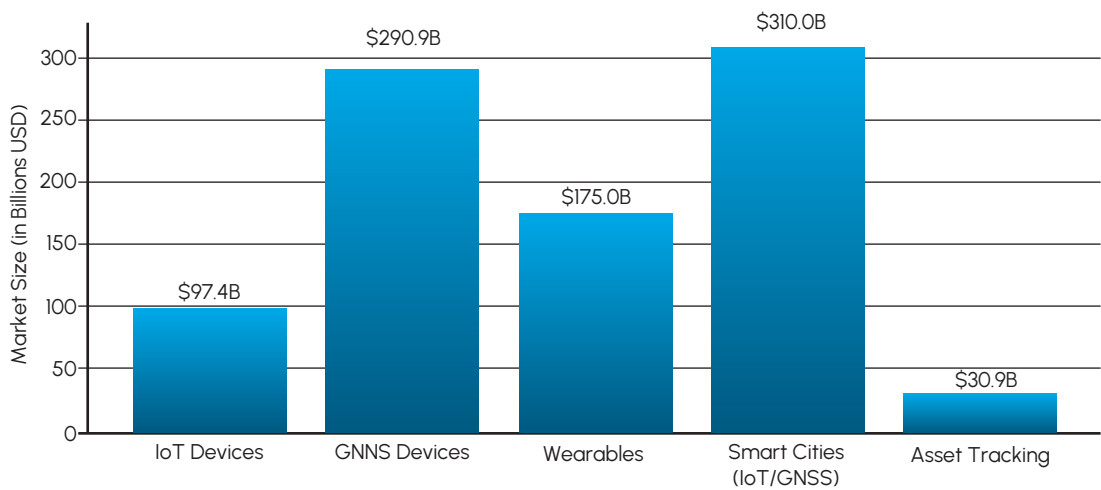
Source: Precedence Research - IoT Devices; Fortune Business Devices - GNSS Devices

Market growth across multiple segments continues to support this trend, as illustrated in Figure 3. The total addressable market (TAM) for radio chip-enabled IoT devices—including GNSS, wearables, smart cities, and asset tracking—is projected to reach $904B by 2026, based on estimates from 360i Research (2025), MMS (2025), Polaris Research (2025), Market.us (2025), ResearchandMarkets (2025), and GrandView Research (2025). Qualinx is targeting approximately 1 – 2% of this TAM, positioning its portfolio to address key industry challenges such as energy efficiency, security, multi-protocol support, and scalability, which are critical requirements for enabling broad IoT adoption.

Figure 4: Projected Market size 2025 - 2030

Product Development and Future Innovation: Qualinx's Dragonfly™ technology is the cornerstone of product development, which will focus on its strengths, namely ultra-low power consumption as demonstrated with the QLX3Gx, the first GNSS chip to market to operate at 1mW, with flexibility and reconfigurability.

Concretely, this means Qualinx's roadmap will:

Reinforce the current GNSS capabilities of their solutions to cover the entire spectrum of GNSS capabilities. For example, Qualinx partners with EUSPA to authenticate their low-power GNSS receiver through the Galileo Open Service Navigation Message Authentication (OSNMA). Expanding this collaboration of Galileo-compatible devices presents the opportunity to unlock new use cases with considerable benefits, leveraging Galileo's secure and global reach across multiple market segments.

Push the boundaries for low power operation by venturing into sub-1mW operation levels, by enhancing the design and the use of advanced CMOS nodes (e.g., 7nm or 5nm). This reduces power draw while maintaining performance and developing a flexible digital front-end capable of processing a broader spectrum.

The use of more advanced CMOS nodes will also allow the flexible digital front-end to be capable of processing a broader spectrum (e.g., from sub-GHz LPWAN bands to 5G's mmWave frequencies)

Support for a burgeoning range of IOT protocols to support a fragmented IOT and LP-WAN market with protocols ranging from NB-IOT, LoRa, LTE-M to Weightless or Mioty to attain ecosystem-wide breakthroughs in applications, such as asset tracking, environmental monitoring, and smart agriculture, where geolocation and connectivity are critical.

Expansion Strategies: Qualinx's expertise positions the company to meet growing market demand while expanding into new high-potential segments. Its growth strategy centers on leveraging core strengths, such as energy efficiency, compact design, and flexible wireless capabilities, to drive adoption in high-growth sectors and build strategic partnerships.

Qualinx's GNSS portfolio is fully positioned to meet burgeoning demands across diverse applications such as precision agriculture, rural connectivity, Automotive, and consumer electronics. This includes alignment with driving adoption across emerging geographical markets, such as Asia-Pacific, Latin America, and Africa, which are experiencing rapid adoption of IoT, smart infrastructure, and mobile connectivity, all of which demand low-power, high-performance radio solutions.

Telco Ecosystem Expansion. Within the telco ecosystem, Qualinx's support for IoT connectivity (e.g., NB-IoT, LoRa) and GNSS makes it a valuable partner for telecoms building smart city infrastructure, connected vehicle networks, and 5G-enabled IoT ecosystems. Specifically, top-tier telcos can gain a competitive advantage by bundling Qualinx-powered devices with their LPWAN or 5G networks, offering end-to-end solutions for asset tracking or smart metering. Moreover, 5G and IoT solution providers are positioned to gain valuable ecosystem mindshare by collaborating with Qualinx to accelerate energy-efficient sensors and trackers in urban projects, enhancing connectivity and sustainability.

Across expanding verticals, the healthcare industry is increasingly adopting IoT for remote patient monitoring, wearables, and medical asset tracking, where Qualinx's low-power GNSS and connectivity solutions can shine. By developing specialized chips for medical wearables (e.g., glucose monitors, smart patches) that require long battery life and precise location data, top-tier healthcare medical suppliers are well-suited to embed Qualinx technology in their devices.

Software-defined connected and autonomous vehicles need efficient, reliable wireless solutions for security interval tracking of vehicles and anti-theft measures, as well as upstream tracking of vehicles and vehicular parts for fleet management, technological areas in which Qualinx excels. As such, collaboration with top-tier auto suppliers to integrate Dragonfly™ into telematics systems can boost their ability to sharpen competitive differentiation.

Conclusion

Looking ahead, Qualinx's Dragonfly™ platform is poised to redefine the wireless landscape, serving as a technological cata-lyst across diverse markets - from precision wearables and smart cities to large-scale industrial IoT. By harmonizing ultra-low power consumption, robust reconfigurability, and scalable chip integration, Qualinx empowers manufacturers to deliver smarter, more agile devices that seamlessly adapt to evolving connectivity demands. As digital RF technology sets new standards for efficiency, security, and interoperability, Qualinx is primed to unlock unprecedented value for its partners and customers, driving sustained innovation, accelerating time-to-market, and enabling the next generation of connected solutions on a truly global scale.

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ABOUT QUALINX

Qualinx is a semiconductor company pioneering ultra-low-power GNSS technology with its patented Digital RF (DRF) design technology. Its flagship solution, Dragonfly, is a highly integrated GNSS receiver chip designed for IoT, wearables, asset tracking, and other battery-sensitive applications. By dramatically reducing power consumption while maintaining high-precision positioning, Qualinx is enabling a new wave of GNSS-enabled devices. Positioned at the heart of the GNSS value chain, Qualinx bridges advanced signal processing and end-user device integration.

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