



Revolutionizing telecommunications

How satellite technologies are enhanced by quantum sensing

Dr. Aaron Kemp and Brian Miske



Quantum sensing for commercial applications

Imagine a world where technology not only meets our expectations but exceeds them, where the limits of what we thought possible are shattered by the profound capabilities of quantum sensing. Welcome to “Quantum Sensing for Commercial Applications,” an article that will take you on an inspiring journey through the transformative potential of this groundbreaking technology in the satellite technology sector.

We will explore specific use cases that illuminate how quantum sensors can enhance our understanding and interaction with the world around us. We will also confront the challenges that accompany these innovations, examining how businesses can navigate the complexities of implementation while

“Quantum sensing stands not merely as a technological leap but as a catalyst for reimagining what’s possible in various commercial landscapes.”

Dr. Aaron Kemp,
Director, Enterprise Innovation, US Quantum
Leader, Emerging Solutions, KPMG LLP



By integrating quantum sensing with satellite technologies, we are set to revolutionize telecommunications, offering unprecedented accuracy and security that will redefine connectivity and create new commercial opportunities.”

Brian Miske,
US Ignition Leader, Americas
Space Leader, KPMG LLP

considering the broader implications for society.

As we embark on this exploration, our goal is to provide you with insights that are not just informative but also actionable. Quantum sensing is not merely a technological advancement—it is a catalyst for innovation and growth. Together, let's unlock new opportunities and reimagine what's possible in the commercial landscape.

Defining quantum sensing

Quantum sensing leverages the principles of quantum mechanics, such as entanglement and superposition, to achieve unprecedented precision in measuring physical quantities. This technology holds transformative potential across various sectors, particularly in telecommunications, by enhancing the accuracy and reliability of position, navigation, and timing (PNT) systems. Quantum sensors can operate effectively even when traditional systems such as GPS are unavailable or unreliable due to interference. This capability opens new financial opportunities by enabling more resilient communication networks, improving synchronization for financial transactions, and supporting advanced applications such as autonomous vehicles and smart infrastructure management. As these sensors become more affordable and scalable, they promise to drive significant advancements in both commercial and strategic areas.



Imagine a world where quantum sensing pushes the boundaries of what's possible, transforming industries and enhancing our interaction with the world around us."

Dr. Aaron Kemp,
Director, Enterprise Innovation, US Quantum
Leader, Emerging Solutions, KPMG LLP

Quantum sensing overview

Quantum sensing is poised to disrupt telecommunications by pushing the boundaries of what's possible. Imagine a world where data flows seamlessly and securely, free from the constraints of current technologies. Quantum sensors, with their unparalleled precision, can detect and correct errors in communication systems before they even occur. This capability challenges the status quo, forcing us to rethink our reliance on outdated infrastructure and embrace a future where quantum technologies redefine connectivity.

Quantum sensing is set to transform the telecommunications and satellite industries by revolutionizing PNT systems. By harnessing quantum mechanics, these sensors offer unmatched accuracy and reliability, crucial for data synchronization across networks. This enhanced precision is especially valuable in challenging environments, such as urban areas with signal interference. As traditional GPS systems face

limitations, quantum sensing provides a robust alternative, providing continuous service and opening new possibilities for applications like autonomous vehicles. The integration of quantum technologies promises to redefine network performance and security, offering significant financial opportunities for forward-thinking companies.

Enhancing data transmission

The race for faster data transmission is relentless, yet traditional methods are reaching their limits. Quantum sensing offers a radical solution by enabling near-instantaneous data transfer through quantum entanglement and superposition. This isn't just an incremental improvement—it's a paradigm shift that could render current high-speed networks obsolete. The potential for quantum-enhanced data transmission challenges telecom giants to innovate or risk being left behind in a rapidly evolving digital landscape.

Quantum key distribution

In an era of increasing cyber threats, quantum key distribution (QKD) represents a revolutionary leap in communication security. By leveraging the principles of quantum mechanics, QKD immediately detects any attempt at eavesdropping. This level of security is unattainable with classical encryption methods, posing a direct challenge to current cybersecurity strategies. As businesses grapple with data breaches and privacy concerns, QKD offers a compelling alternative that could redefine trust in digital communications.



Overcoming traditional limitations and practical applications

Traditional telecommunications systems are plagued by interference and bandwidth limitations. Quantum sensing obliterates these barriers by offering unprecedented accuracy and efficiency in signal processing. This advancement forces us to confront the inadequacies of existing technologies and consider the transformative potential of quantum solutions. As we transition to a quantum-enabled future, industries must adapt or face obsolescence.

Quantum sensing is already making waves in telecommunications through applications such as enhanced GPS systems and improved signal detection in remote areas. These innovations challenge conventional wisdom about what's achievable in connectivity, opening new frontiers for exploration and development. As these applications gain traction, they compel industry leaders to rethink their strategies and embrace quantum technologies as a cornerstone of future growth.

Security advancements and industry challenges

Quantum sensing doesn't just enhance security—it revolutionizes it. By leveraging quantum properties, we can achieve levels of encryption that are theoretically unbreakable by classical means. This advancement poses a direct threat to current security protocols, demanding a reevaluation of how we protect sensitive information. As cyber threats evolve, quantum sensing offers a proactive defense mechanism that could redefine the landscape of digital security.

Adopting quantum sensing in telecommunications isn't without its challenges. High costs, technical complexity, and the need for specialized expertise create significant barriers to entry. However, these obstacles also present opportunities for innovation and collaboration among industry leaders willing to invest in the future. As companies navigate these challenges, those who succeed will set new standards for excellence and redefine what's possible in telecommunications.



As quantum sensing technologies become more scalable, businesses will be able to harness their potential to innovate and achieve significant competitive advantages.”

**Dr. Aaron Kemp,
Director, Enterprise Innovation, US Quantum
Leader, Emerging Solutions, KPMG LLP**

Looking beyond

The integration of quantum sensing technologies into telecommunications heralds a future filled with untapped potential. From ultra-secure communications to unprecedented data speeds, the possibilities are limitless. This transformative power challenges us to envision new applications and business models that leverage quantum capabilities fully. As we stand on the brink of this technological revolution, the question isn't whether we'll embrace quantum sensing—it's how quickly we can harness its potential to reshape our world.

According to the latest *KPMG Futures Report*, Quantum Computing is positioned as a horizon disruption.* With postquantum encryption standards set to emerge this year, quantum encryption is expected to be the most immediate priority in this space. While general-purpose quantum computers may still be years away, experimenting with quantum use cases today offers companies a strategic advantage in preparing for the opportunities this technology will unlock.

At **KPMG Enterprise Innovation**, we have been closely tracking the quantum computing frontier. Through strategic partnerships with organizations such as the *Chicago Quantum Exchange* and *IBM*, we are exploring how quantum can accelerate real-world solutions.

**Horizon disruption is change that is poised to happen for a time, and then finally does.*



Integrating quantum sensing into satellite technologies is a strategic move that can redefine the telecommunications landscape. Through the Chicago Quantum Exchange, KPMG is supporting the development and adoption of quantum sensing in satellite technology. Companies that embrace this technology can not only enhance their network security and reliability, but also open up new revenue streams and market opportunities."

Jeff King

Chicago Managing Partner, KPMG LLP
jbking@kpmg.com

Discover the Possibilities with KPMG Ignition

Kick off your journey into the future with KPMG Ignition's Discovery Session on Quantum and Quantum Sensing. This immersive session is designed to give your team a firsthand look at the potential of quantum technologies and how they can revolutionize your industry. Whether it's the profound impact on drug discovery in the pharmaceutical sector or the game-changing improvements in telecommunications and satellite technology, our Discovery Session will provide you with invaluable insights and actionable strategies.

Don't just witness the future—be a part of shaping it. At **KPMG Ignition**, we're committed to turning innovative concepts into practical, impactful solutions. Join us, and let's harness the transformative power of quantum sensing to unlock new possibilities for your business. Together, we can drive forward-thinking initiatives and maintain a competitive edge in this rapidly evolving landscape.

Authors



Dr. Aaron Kemp
Director, Enterprise Innovation, US Quantum Leader, Emerging Solutions, KPMG LLP
aaronkemp@kpmg.com



Brian Miske
US Ignition Leader, Americas Space Leader, KPMG LLP
bmiske@kpmg.com

Contributors



Richard Entrup
Managing Director, Enterprise Innovation, Head of Emerging Solutions, KPMG LLP
rentrup@kpmg.com



Jeff King
Chicago Managing Partner, KPMG LLP
jbking@kpmg.com

Learn about us:



kpmg.com

The information contained herein is of a general nature and is not intended to address the circumstances of any particular individual or entity. Although we endeavor to provide accurate and timely information, there can be no guarantee that such information is accurate as of the date it is received or that it will continue to be accurate in the future. No one should act upon such information without appropriate professional advice after a thorough examination of the particular situation.

© 2026 KPMG LLP, a Delaware limited liability partnership, and its subsidiaries are part of the KPMG global organization of independent member firms affiliated with KPMG International Limited, a private English company limited by guarantee. All rights reserved. USCS024045-1C