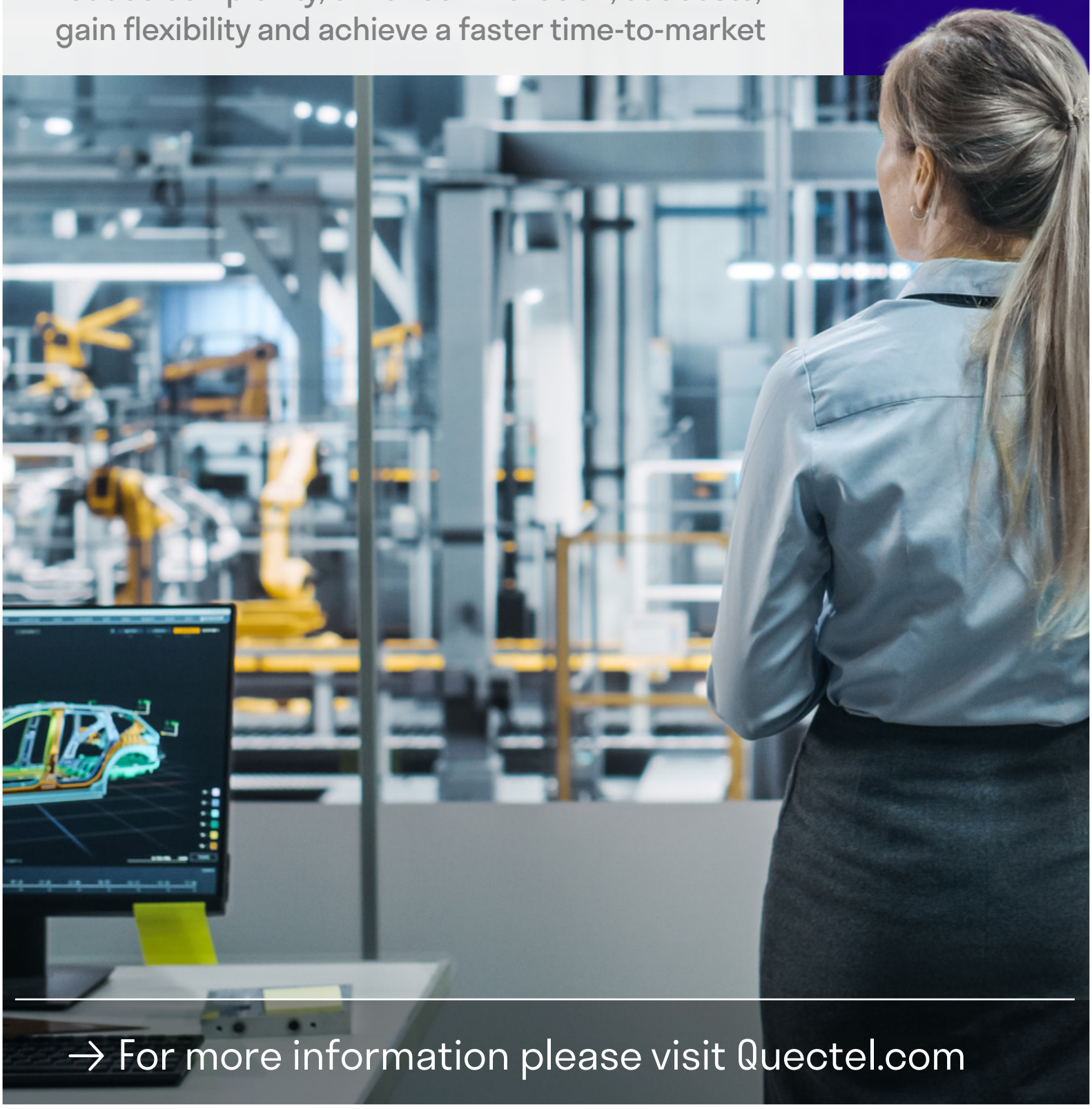
QUECTEL

Build a smarter world

End-to-end IoT solutions provider white paper

Choose an end-to-end IoT solutions provider to reduce complexity, enhance innovation, cut costs, gain flexibility and achieve a faster time-to-market



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INTRODUCTION

The Internet of Things has now reached massive scale and the growth is set to continue. In the cellular IoT market alone, analyst firm IoT Analytics has reported year-over-year growth of 23% for the first quarter of 2025[1] while Berg Insight projects that by 2029, there will be 6.4 billion IoT devices connected to cellular networks worldwide.[2] The market is already enormous and getting bigger.

This changes the game significantly. A few years ago a large deployment was measured in the tens of thousands of units but multi-million-unit deployments are now increasingly common.

At the same time, the volume of IoT devices has radically increased as innovation, economies of scale and greater awareness all combine to create a wildly larger market for IoT technologies.

Technological advances have made features, capabilities and use cases that were previously unviable sources of profit and value for organizations of all types. Yet this comes with complex challenges and multi-layered complexities. IoT deployments now routinely span global markets and therefore require multiple carrier certifications, compliance with regulations in each market they are deployed in, adherence to trading rules and the need to be flexible to manage geopolitical instability.

1 https://iot-analytics.com/wp-content/uploads/2025/07/INSIGHTS-RELEASE-Cellular-IoT-Module-Shipments-Grew-23-percent-in-Q1-2025.pdf
2 https://www.berginsight.com/cellular-iot-connectivity-revenues-reached--142-billion-in-2024

AVOID HAND-OFF ERRORS

What was manageable for a 10,000-device deployment in one region is rapidly becoming unmanageable for deployments in which hundreds of thousands of IoT solutions are rolled out globally. An IoT solution can be viewed as an athletics relay team in which there are hand-offs between athletes. In IoT's case those hand-offs are between components, such as modules, antennas and processors; software, such as operating systems, applications and user interfaces; and services which include certification, antennas, RTK corrections, original design manufacturer (ODM) services and cyber security.

At each hand-off there's a risk of the baton being dropped, causing delay, adding complexity and increasing overall cost. The traditional model would have either seen an IoT service provider identify their opportunity and go to the market to buy each of these ingredients separately. This would have necessitated a lengthy specification and selection process followed by extensive integration work between each vendor to ensure smooth operation of the overall solution. The management burden of this and the time involved is extensive and potentially crippling for an IoT project.

DIY DISASTERS

Alternatively, a company could seek to build its own IoT capabilities, developing parts or all of this chain of services and components in-house. There are multiple problems associated with this approach. First, there is a shortage of relevant skills available to hire and second, many companies only require specific IoT developer skills for relatively constrained periods of time. If you're a smart lighting manufacturer designing a new product, you need the expertise during that development phase but once the product is ready that expensive and hard to recruit IoT development team might be underused.

The growth of IoT has put even more pressure on availability of skilled resources and the additional complexity of modern IoT solutions, which offer richer features and capabilities, puts extra pressure on IoT developers. Essentially, the expectation is to do more with less and for lower expenditure. It's increasingly recognised that disjointed, multi-vendor approaches to IoT solution design are inefficient, slow and expensive so companies are looking to streamline development into a smooth, end-to-end process in which the hand-offs are pre-determined and the baton is not dropped.

Vendors are engaging with this need as Satyajit Sinha, the principal analyst at IoT Analytics, attests: "Manufacturers will increasingly seek value through integrated solutions combining hardware, software, connectivity and ODM services."

SINGLE SUPPLIER SIMPLICITY

In contrast to fragmented approaches, some of which combine the worst of the do-it-yourself approach with the obstacles of managing multiple suppliers, selecting a single supplier to enable your IoT project from end-to-end eradicates risk, removes complexity, adds speed and saves cost. These advantages are achieved while providing access to a deep pool of expertise and resources such as manufacturing, distribution, certification, compliance and security. In addition to this, end-to-end solution providers offer unparalleled flexibility, enabling customers to take the parts of their offerings they need and continue to utilise in-house capabilities or solutions from other vendors.

This is of particular value for IoT organizations that are committed to long-term contacts such as those with cellular carriers or those that have built substantial IoT-related capabilities in specific areas, such as software design, RF design or their proprietary user interface. Providing the choice of when and how to use elements of an end-to-end IoT service delivers true flexibility.

Some module vendors are already well-advanced on this journey and have created a comprehensive, end-to-end IoT solutions portfolio spanning the entire IoT development path from initial concept through live deployment and ultimately IoT device retirement.

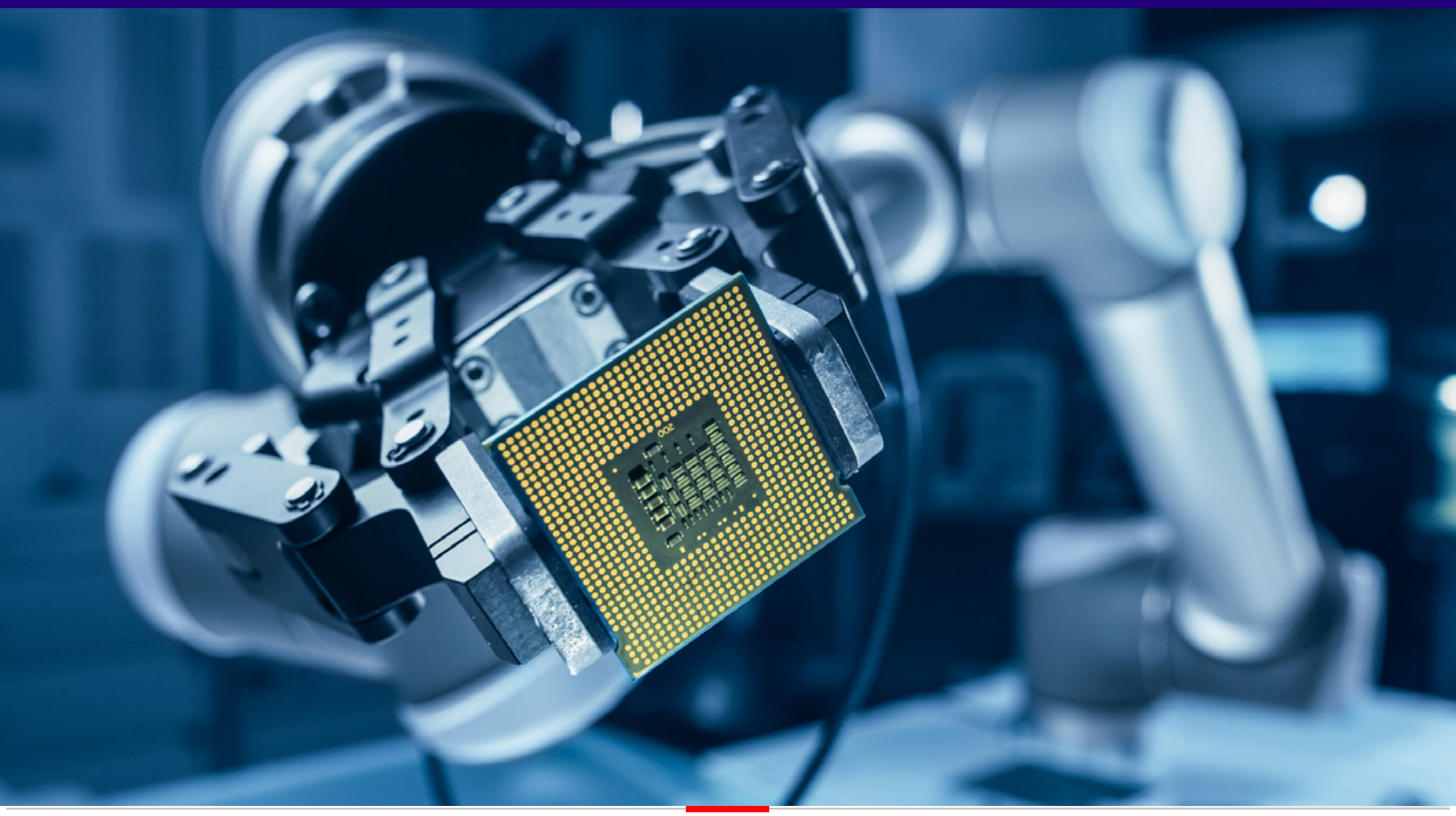
UNIQUENESS AT SCALE

The intent is not to provide a unified set of capabilities to create homogenous IoT products but to foster uniqueness and innovation at mass scale by supplying the common ingredients an IoT solution depends upon. By addressing fundamental requirements from modules to antennas, hardware designs, software to user interfaces, and supply chain to manufacturing, the end-to-end solutions approach ensures optimized design and manufacturing alongside streamlined compliance with robust security. Doing so frees up IoT organizations to focus on the specific attributes of their offerings and applications and the value their products can bring to their customers.

They can maintain their brand values and strengthen what differentiates them in the marketplace while their end-to-end IoT solutions provider abstracts away the challenges of IoT product creation and deployment. Essentially, this approach allows an organization to focus on their core value without distraction by providing the IoT capabilities they need, when and where they are needed. That is simple to say but difficult to execute at massive IoT scale across the globe.

WHAT YOU NEED, WHEN YOU WANT IT

Quectel uniquely has created a comprehensive set of IoT solutions. Encompassing hardware, software and services the Quectel portfolio also includes sub-brands to support specific sectors and strategic partners in adjacent disciplines. The company, which was established in 2010 and now has more than 7,000 customers, continues to focus on innovation with eight R&D centers across the globe including facilities in Belgrade, Delhi, Penang and Vancouver. These total 8,000m^2 of lab area.



HARDWARE

Quectel is best known for its expansive range of modules which, combined with Quectel antennas, enable resilient connectivity for millions of devices. Connectivity technologies from low power wide area networks (LPWANs) to 5G are supported by these components with technologies such as Wi-Fi, Bluetooth and GNSS also served by Quectel modules.

Quectel continues to be at the leading edge of module innovation continuously bringing new modules and variants to market. In addition, Quectel also offers EVB kits and smart solutions, including products such as an edge computing box, to bring intelligent hardware to IoT organizations.

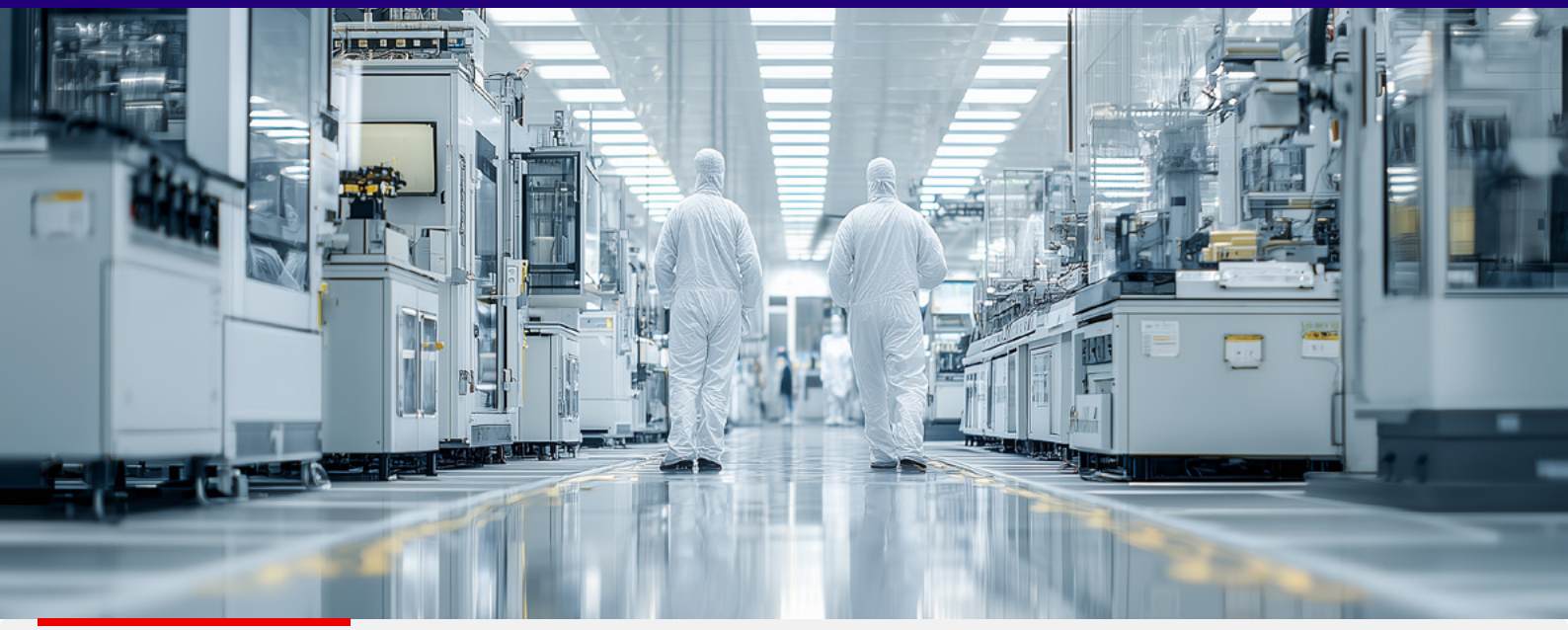
SOFTWARE

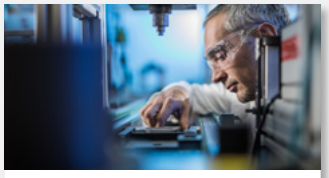
Quectel's software expertise can be seen with QuecPython - its low code development platform that utilizes the Python programming language to build IoT applications directly on to cellular modules.

Quectel also offers an integrated software suite for IoT development along with drivers and SDKs to enable complex applications such as AI and edge computing for embedded devices and smart modules.

SERVICES

The Quectel service portfolio is comprised of offerings in the following areas in addition to services for bespoke development of software and interfaces.





Antenna services

In many markets, antennas need to be custom designed for specific use cases. Automotive OEMs, for example, embedded antennas in their vehicles and customization of antennas is required for numerous use cases. Issues such as interference and signal reception and propagation need to be considered with antenna solutions requiring specific development for installation in assets such as heavy equipment, two-wheelers, robots and many others.

Quectel's antenna services extend from initial analysis, with services that include the electrical path from the antenna to the receiver and beyond, as well as mechanical and RF design support for devices with limited space. The service portfolio includes technical requirement analysis and device overview, antenna selection and antenna design integration recommendations.

RTK Correction Solution

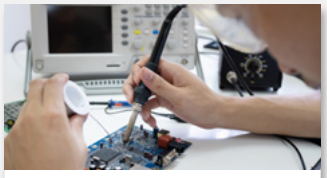
A real-time kinematic correction service provides real-time centimeter-accurate GNSS positioning information for GPS-based systems by transmitting error correction data from fixed base stations to mobile receivers. By combining GNSS modules with a broad range of connectivity options plus antennas, RTK correction services and design review, Quectel has assembled a comprehensive solution for precise GNSS positioning use cases.

Customers can adopt the one-stop-shop approach to ensure complete control and visibility into their RTK correction-supported GNSS positioning, or simply take the services or components they want, while avoiding vendor lock-in.

ODM services

Original device manufacturers (ODMs) combine device design and development capabilities with large scale manufacturing, regulatory compliance and certification. In addition, they can help accelerate the path from idea to execution. Critically, their extensive resources typically result in significant overall cost advantages and shortened development cycles.

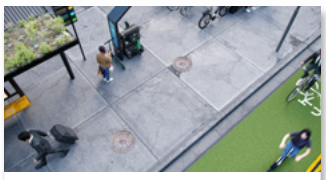
ODMs are ideal for organizations that lack device engineering resources, access to cost-efficient manufacturing and compliance expertise. They can also deliver value by providing sector-specific expertise, knowledge of the latest innovations and awareness of the competitive landscape. A further benefit is that an ODM can support a customer in one or several areas or as a one-stop shop, taking on an entire project from end-to-end.



Certification and testing services

Quectel's comprehensive range of certification and testing services for IoT devices have been developed using Quectel's years of experience to make it faster and simpler for IoT organizations to gain product certifications. Quectel offers a pre-scan service in its own labs so certification compliance can be assessed before applying to certification authorities, thereby saving time on non-compliant certification applications. Quectel also offers technical support facilities and debugging solutions to address common, and not so common, certification issues. Quectel's capabilities include project management, all paperwork tasks, dealing with labs and carriers, checking the test scope and making the minimum test scope, providing the necessary on-site support and providing testing and debugging. In addition, Quectel will fix issues as they arise and negotiate waivers where appropriate.

Quectel Certification Services are flexible and enable customers to utilize the resources they have while being able to lean on Quectel to address areas where help is needed. Quectel maintains long-term co-operation with all types of third-party labs so work done can integrate easily and create the overall project outcome.



Reliability testing services

Quectel provides reliability testing capabilities for both environmental and mechanical factors. Environmental reliability testing capabilities include high and low temperature testing for both operation and storage, high temperature and humidity testing, dust and waterproofing testing and thermal shock testing. Quectel Reliability Testing Services also address mechanical reliability with drop testing of both the component and its box, testing for random vibration, friction, and insertion and withdrawal.

IoT security services

Quectel has a long-term commitment to security by design, a secure supply chain, regulatory compliance, comprehensive security testing with transparency and security bills of materials (SBOMs) in addition to regular updates and continuous protection. The company has its own product security incident response team (PSIRT) which can be contacted via a form on its web page and utilizes independent security specialist Finite State to assure the security posture of its products.

The Quectel Certification Service has expanded rapidly and now covers more certifications including safety, as well as Quectel Security Certification services. Quectel's Cybersecurity Certification Service can provide network traffic analysis, wireless penetration testing, Denial of Service (DoS) simulations, firmware and application analysis, data protection impact assessment, security feature assessment, vulnerability assessment and exploitation and cryptographic analysis.

For compliance with the EU CRA, which will be mandatory for Europe from 2027, Quectel has developed SBOMs, security testing and vulnerability management documentation to meet the new requirements. Quectel CRA compliance services include:

- Identification of known vulnerabilities including SBOM generation, vulnerability enrichment and firmware analysis
- Protection against exploitation of vulnerabilities via network and wireless testing and application and firmware penetration testing
- Secure configuration and hardening which include configuration assessment and cloud security assessment
- Incident handling and recovery composed of consulting services and blue team collaboration

Manufacturing services

Quectel is a mass-scale manufacturer in its own hardware business and brings this skill and its resources to customers in the form of Quectel Manufacturing Services at its own manufacturing sites in Malaysia, Brazil and India. With production capacity for 30 million units per month, Quectel is ideally placed to handle even the largest scale IoT manufacturing requirements and its global footprint provides the flexibility to mitigate geopolitical instability.

STRATEGIC PARTNERS

Quectel has long-term relationships with a carefully chosen set of strategic partners to provide additional capabilities in markets across the globe. These companies work closely with Quectel to assure the goals of customers are met and efficiency is optimized.

Acceleronix

Acceleronix is an all-in-one IoT partner, delivering scalable, reliable solutions from design to deployment. The company accelerates IoT projects by providing solutions that reduce complexity, eliminate risks and empower customers to innovate, building smarter and more efficient solutions. The company offers a cloud-based IoT device development and management platform, services including design, manufacturing and deployment, connectivity in the form of cellular and satellite connectivity, eSIM, iSIM and vSIM solutions, and connectivity management and billing.

ikotek

Ikotek is a specialized, USA-headquartered global provider of original design manufacturing (ODM) for IoT. The company combines end-to-end design consultancy across program management, R&D, sourcing and production at its own manufacturing facilities to produce designs for customers. Ikotek is a one-stop-shop for IoT device design, manufacturing and certification delivering high quality products and services to reduce complexity, speed up time to market, eliminate risk and reduce costs.

IoTronix

IoTronix is dedicated to intelligent IoT manufacturing. Based in Malaysia, it specializes in end-to-end manufacturing tailored to the unique needs of IoT industries worldwide. Services extend from material sourcing to final production with assembly, testing, quality assurance and post-production logistics available. The company offers fully flexible manufacturing solutions to help accelerate time to market and ensure both quality and reliability.

CONCLUSION

The rush to massive scale IoT has placed a complex, multi-layered set of pressures on business across the globe, demanding establishment of new skills, policies, strategies and technologies. There's a significant risk that the core focus of a business can be swamped in the rush to select connectivity, specify device components, manufacture at scale, achieve compliance and optimize costs and efficiency.

Selecting an end-to-end provider frees up businesses to focus on their core competencies by taking a fully-developed IoT platform and devices to add their secret sauce and market knowledge to.

Elements provided by an end-to-end provider will be stress tested, already in use at scale and developed from years of experience. The effect of that is accelerated time to market, reduced friction and smooth rollout.

Even better, an end-to-end solutions provider like Quectel doesn't demand that you take the full end-to-end offering. You can simply take what you need, when you want it, ensuring you have the flexibility to mitigate geopolitical instability with globally distributed R&D and manufacturing resources. You can also be assured that quality, security and compliance have all been addressed at hyper scale.

To learn how Quectel can help simplify and accelerate your IoT operations, visit www.quectel.com.

To find out more about any of our products or services, please contact:

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