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THE SECRET TO RAPID IOT DEVELOPMENT

Paul Bearpark and **Kufirre Ebong** discuss how to deliver reliable, secure and scalable IoT products at speed

In today's fast-paced world, the pressure to launch connected products quickly is higher than ever. Market demands, competitive pressures, and customer expectations leave no room for sluggish development cycles. The challenge is delivering reliable, secure, and scalable IoT products without unnecessary delays.

Designing a connected device requires careful balancing of development speed, security, and cost efficiency and the right approach is crucial: should companies build from scratch, use integrated platforms or specialised modules? The answer depends on a company's priorities and resources, as well as the market it intends to serve.

Companies currently have three fundamental approaches available to them when selecting the right mix of components, ensuring and balancing customisation with efficiency, these are: designing everything in-house, adopting an integrated IoT platform, or using cloud-provider modules for a hybrid solution.

The first approach, a fully custom or DIY solution, offers total control over hardware, firmware, and cloud infrastructure, it allows companies to fine-tune every aspect of their product, ensuring maximum performance, security, and flexibility. However, it requires significant engineering resources and expertise, and the time-to-market is considerably longer.

The second option, integrated IoT platforms, accelerates development by bundling pre-certified hardware, connectivity, and cloud services into a single package. This approach eliminates many of the technical challenges associated with connectivity and security, allowing teams to focus on application development rather than infrastructure management. The trade-off is vendor dependency, as companies must commit to a platform's ecosystem and pricing structure.

Finally, the hybrid approach involves using specialised modules from cloud providers such as AWS IoT ExpressLink or u-blox cellular solutions that provide a streamlined connection to cloud services while still allowing some degree of customisation. Although this solution simplifies cloud integration, it can lead to partial vendor lock-in and may require additional configuration to ensure compatibility with legacy systems or third-party services.

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THE DIY APPROACH

For companies that demand complete control over their product architecture, the DIY approach provides unmatched flexibility. This method allows for custom hardware selection, bespoke firmware design, and tailor-made cloud services. Security can be implemented at every level, from secure boot processes, sophisticated encryption protocols and certificate management, ensuring the highest level of protection for connected devices.

However, developing an IoT solution from scratch requires deep expertise in multiple domains, including embedded systems and device provisioning. Device management must also be considered, along with over-the-air (OTA) updates and regulatory compliance. Each of these elements introduces complexity and extends development timelines, making it a viable option only for companies with significant engineering resources and long-term investment capacity.

For businesses creating highly specialised hardware such as medical devices, DIY development can provide a competitive edge. But for companies

looking to launch quickly, this approach may introduce unnecessary hurdles.

INTEGRATED IOT PLATFORMS

For businesses prioritising speed, integrated IoT platforms offer a streamlined development path. These platforms bundle essential IoT components such as hardware, connectivity, and cloud infrastructure into a pre-configured package significantly reducing development time and complexity - it's an attractive option for businesses with limited engineering resources.

One example is Blues, whose Notecard and Notehub ecosystem provides a secure, low-power module that seamlessly connects devices to cloud services by cellular, Wi-Fi, satellite or LoRa. With pre-configured security features, fleet management tools, and built-in OTA update capabilities, companies using these solutions can bypass many of the hurdles associated with traditional IoT development.

This approach enabled American Crane & Equipment, an industrial equipment provider, to bring their connected solution to market quickly. Facing the challenge of modernising their legacy systems, they needed a solution that would integrate seamlessly with their existing infrastructure while adding cloud connectivity and remote monitoring capabilities. By incorporating the Blues Notecard into their product, they significantly reduced development time leading to upfront savings.

The accompanying Notehub cloud platform streamlined data routing and device management, allowing for secure, scalable deployment. With the ability to push OTA updates and monitor device performance in real time, American Crane was able to enhance operational efficiency while maintaining security and compliance.

This example demonstrates how integrated IoT platforms can accelerate development and reduce complexity for businesses looking to deploy connected products at scale. However, some companies may be concerned about vendor dependency which can mean switching providers or modifying core components may not be straightforward. Also, platform licensing fees or service subscriptions can impact long-term operational costs.

CLOUD-PROVIDER MODULES

For those seeking a balance between flexibility and ease of development, cloud-provider modules offer an appealing compromise. Solutions like AWS IoT ExpressLink integrate seamlessly with cloud services, enabling rapid deployment while still allowing some degree of customisation. These modules come with built-in security and provisioning mechanisms, streamlining the process of connecting devices to the cloud.

This approach works well for companies that are already invested in a specific cloud ecosystem. By leveraging cloud-provider modules, businesses can reduce the complexity of secure connectivity while maintaining flexibility in hardware selection. However, the reliance on a specific cloud vendor may create challenges if the product needs to expand beyond that ecosystem in the future.

Security remains a top priority, requiring robust encryption, secure boot mechanisms, and proper key management to protect devices from cyber threats. Connectivity is another major factor, with options such as Wi-Fi, cellular, LoRaWAN, and satellite each offering different trade-offs in terms of cost, coverage, and power consumption.

OTA updates are essential for maintaining security and functionality over time. A reliable update mechanism ensures that devices remain protected against vulnerabilities and can receive feature enhancements post-deployment. Similarly, regulatory compliance must be factored into the development process, as different markets require adherence to various regulatory regimes such as FCC or CE certification.

Long-term scalability should also be considered. A product designed with modularity in mind will be better positioned for future upgrades and expansion. Costs must be carefully managed as well, weighing the initial investment against long-term operational expenses.

LOOKING AHEAD

As emerging trends such as integration of terrestrial and satellite networks, integrated SIM solutions, and edge AI continue to shape the IoT landscape, the modularity and automation of IoT platforms are set to evolve further.

Companies like Blues are not only enabling faster development cycles but are also paving the way for smarter, more secure, and scalable connected products. Whether you're innovating in industrial automation or consumer electronics, understanding these different approaches and their respective trade-offs will be essential in "cooking up" a successful connected product.

By carefully weighing the options and using proven solutions the journey from concept to market can be faster and easier to navigate.

So, launching a connected product requires careful consideration of multiple factors. Successful IoT development hinges on iteration, adaptation, and using the right ingredients for success.

The key is to strike the right balance between speed, control, and scalability.

By carefully evaluating the available development approaches, IoT developers can choose the path that best aligns with their goals, ensuring they create a product that is both innovative and can be sustained over the long term. NE

> "DESIGNING A CONNECTED DEVICE REQUIRES CAREFUL BALANCING OF DEVELOPMENT SPEED, SECURITY, AND COST EFFICIENCY AND THE RIGHT APPROACH IS CRUCIAL"

1. American Crane - the Orion test vehicle cleanroom hoist.

2. The DIY approach to developing connected products delivers unmatched flexibility.