cellXica 5G Base Stations Connect Private 5G Networks with Ease, Using AMD Zynq™ UltraScale+™ RFSoCs

The design specialists at cellXica (Cambridge, UK) have decades of experience developing radio equipment, embedded systems, cellular base stations and wireless communications systems built for software-defined radio (SDR) technology. The company creates bespoke wireless solutions for customers' unique connectivity requirements in many markets, ranging from manufacturing and industrial to energy and logistics.

Since 2010, cellXica has consistently innovated high-performance, customized solutions, and AMD has been part of that journey. AMD innovations in adaptive SoC technology have helped fuel cellXica's design breakthroughs across several generations of cellXica products.

These innovation paths intersected again, recently, with the design of cellXica's EXSITE®-M5Q® Plus 5G base-station, featuring the industry's first single-chip adaptive radio platform – the AMD Zynq™ UltraScale+™ RFSoC, now in its third generation.

CHALLENGE

cellXica's customers have exacting connectivity requirements, often because they're deploying wireless coverage in harsh environments like oil refineries, quarries, and mines, in addition to traditional environments like manufacturing, industrial and healthcare facilities. In these challenging conditions, cellXica's customers are tasked with deploying highly reliable, low latency wireless networks covering large areas and often in remote locations.

"For many years, Wi-Fi had been the connectivity platform of choice for these types of environments due to its broad device compatibility and perceived low cost," said Niro Mahasinghe, CEO of cellXica Ltd. "Today, the maturation of 5G technology is such that private 5G is much easier to deploy at scale than Wi-Fi. In these deployments, a small number of cellular-standard 5G base stations can cover large areas and handle more simultaneous connections for voice, data, and IoT services than dozens or even hundreds of Wi-Fi access points, with less interference and fewer dead spots."

The adoption of private 5G connectivity is also driven by the need for deterministic performance, which is crucial in complex worksites with highly orchestrated industrial workflows. 5G allows for the seamless, efficient collection of process data in these environments, and the calibration and synchronization of interconnected systems for improved quality control. Additionally, 5G connectivity is beneficial for tracking people and assets worksites, helping to improve worker safety and operational efficiency.

INDUSTRY
5G Networking

CHALLENGES
With demand for private mobile 5G networks surging, cellXica envisioned an all-in-one base station design integrating a complete standalone 5G network in a compact, rugged package. The underlying processing platform had to be optimized for flexibility, customization, and fast time-to-deployment, with a performance profile enabling reliable throughput and deterministic latency 5G communications.

SOLUTION
cellXica's EXSITE®-M5Q® Plus 5G base stations, powered by AMD Zynq™ UltraScale+™ RFSoCs, unify 5G radio access networks and core network functions in a single, integrated device. The AMD Zynq™ UltraScale+™ RFSoC combines digital RF signal processing and programmable logic to enable low-latency, high-throughput traffic with minimal footprint and power consumption.

RESULTS
cellXica's customers benefit from the EXSITE-M5Q Plus 5G base station's all-in-one functionality and deployment flexibility achieved in a compact, rugged design. It delivers low latency, reliable voice and data communications in a single unit with no additional servers or power cabling needed, for customers in the manufacturing, industrial, energy and logistics sectors.

AMD TECHNOLOGY AT A GLANCE
AMD Zynq™ UltraScale+™ RFSoCs

"cellXica is helping customers achieve the many advantages of private 5G networks, and this requires a versatile base station platform tuned to the highest specifications and latest standards," Mahasinghe continued.

"At the processing layer, this requires reliable throughput, deterministic latency performance and development workflows optimized for efficiency and fast time to market."

SOLUTION

cellXica's earlier experience developing specialized 3G and 4G base stations led them to high-performance adaptive SoC and FPGA processing platforms from AMD. cellXica has leveraged AMD platforms since 2012, and has made extensive reuse of hardware, firmware and software, allowing bespoke solutions to be efficiently developed using programmable logic.

"cellXica aims to help customers achieve similar efficiencies in deploying their own private 5G networks, making it very easy for them to flexibly configure 5G connectivity in unforgiving environments," Mahasinghe said. "We accomplished this capability in the development of the EXSITE-M5Q Plus 5G base station, powered by Gen 3 AMD Zynq™ UltraScale+™ RFSoCs."

"Our all-in-one design approach is unique," Mahasinghe continued. "With a typical base station design, you'd find a remote radio unit and a server running base station functions. We put all this functionality into the Gen 3 AMD Zynq™ UltraScale+™ RFSoC, and we're using the RF data converters on the device in a completely private network solution. Customers don't need anything else to deploy, just an Ethernet cable with PoE enabled."

The EXSITE-M5Q Plus's compact and rugged all-in-one form factor speeds up deployment and simplifies network management while keeping deployment and operating costs down. Incorporating base station and core network functions, it delivers secure machine-to-machine and telephony communications, with the quality of service needed by customers in the manufacturing, industrial, energy and logistics sectors.

RESULTS

The EXSITE-M5Q Plus 5G base station features a 4x4 MIMO radio architecture with one watt per antenna port, operating at bands n77 and n78. Delivering up to 450 Mbps throughput, the system enables low latency, reliable voice and data communications with telco-grade end-to-end security, and centralized, secure access control and device management.

"What's fundamentally different about the EXSITE-M5Q Plus is that we integrate the whole network in the box. It has the radio, the baseband processing for the base station and the 5G core network software all in an Arm® processor complex," Mahasinghe said. "Others have tried to do this with chipsets and dedicated SoCs, but by using the programmable logic

fabric on the AMD RFSoC, we can move to the newest standards a lot faster."

cellXica's EXSITE-M5Q Plus is highly scalable and supports a range of deployments, including standalone single cell "bubble of coverage," multi-cell networks covering a single large premises, and/or a family of geographically separate networks securely linked via the public internet. All this is achieved without the need for servers, expensive cloud computing or power cabling at the base station node – power is delivered to the EXSITE-M5Q Plus via Power over Ethernet (PoE), thanks in part to efficiencies at the AMD processing layer.

"cellXica has been able to leverage these innovative technology features while simultaneously extending the value of our investments in previous generation products," Mahasinghe said. "Our migration from 3G to 4G to 5G has been built on a stable code base that's easily reused. This would have been difficult to do with a traditional ASIC-type solution. With the Gen 3 AMD Zynq™ UltraScale+™ RFSoC, we've been able to manage that continuity of code base and depth of testing, history, and maintenance that has gone into that code base. It's been a much smaller step than starting from scratch, yet it puts us far in front of the competition when it comes to innovating new platforms for our customers."
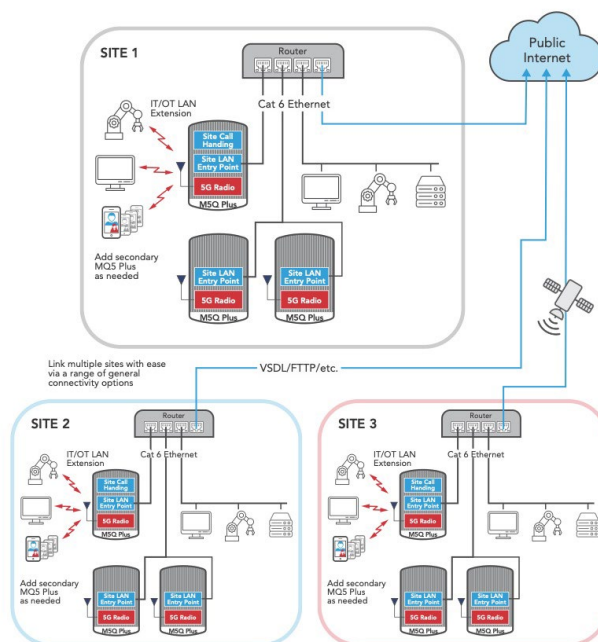
Want to learn more about AMD Zynq™ UltraScale+™ RFSoCs?
Visit our website.

ABOUT CELLXICA

Cambridge, UK-based cellXica is at the forefront of designing and manufacturing specialist cellular radio equipment. The company collaborates closely with mobile network system integrators, managed service providers and customers to fully understand their challenges and requirements. cellXica's integrated-by-design, all-in-one solutions provide reliable and scalable private networks without the need for additional servers. www.cellxica.net

ABOUT AMD

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