Case Study

# Freescale and ENEA: Building Better Base Stations

## Challenge

Get a next-generation LTE/LTE-Advanced eNodeB or WCDMA/HSPA+ NodeB to market fast and with superior use of resources, core utilization and system performance.

## Solution

Enea® software solutions are used together with Freescale QorIQ Qonverge hardware to enable more calls and users, and to maximize data transmission speeds with minimal latency.

## Benefit

The combined advantages of Enea software on Freescale silicon allows customers to scale from macro base stations all the way down to small cell base stations, implementing multiple standards at the same time, with optimal performance.

Nowhere is the requirement to ensure high-performance, increased power efficiency and maximum software scalability while controlling CAPEX costs more clear than in the migration from 3G to LTE (4G) infrastructure. As the world moves toward the 4G LTE and LTE Advanced standards, demand for bandwidth capacity is increasing exponentially. A Cisco study predicts global mobile data traffic will increase 26 fold between 2010 and 2015—a compound annual growth rate (CAGR) of 92 percent from 2010 to 2015, reaching 6.3 exabytes per month by 2015.*

Explosive growth in wireless data usage and fierce competition among the world's top network equipment providers (NEPs) force customers to think carefully when choosing their software and hardware suppliers. When it comes to software and silicon for a robust and highly scalable 4G base station, customers can turn to Enea Software and Freescale Semiconductor.

- Enea is a leading choice among top NEPs to provide a high-performance, highly available software platform that meets the demanding requirements of operators while making software development a straightforward and scalable process.
- Freescale's QorIQ Qonverge platform combines market-proven Power Architecture® cores and high-performance StarCore DSPs with proven application accelerators for packet and baseband processing, security and more.

The two companies' combined global presence and strong networking portfolios come together to improve time to market.

## Customer Focus for Guaranteed Success

For the past seven years, Enea and Freescale have cooperated closely with two of the world's largest base station manufacturers on several commercial projects. Freescale has successfully provided potent Power and StarCore architecture hardware to the projects and Enea has delivered software solutions on that hardware, meeting aggressive timelines while maximizing the performance of the communications processors and DSPs, as well as providing a system-wide communications mechanism, debug tools, and maintenance and support on the customers' proprietary equipment implementations.

* Source: Cisco Visual Networking Index Global IP Traffic Forecast, 2010–2015.

The relationship between the two companies extends well past these projects. “The strategic alliance between Enea and Freescale is forward looking and enables us to align our long-term roadmaps to ensure that our products support Freescale silicon as close to first silicon as possible,” said Dan Andersson, Director of Corporate Alliances at Enea. “Together we will make sure we have the most optimized solutions for Freescale silicon in the marketplace.”

Enea and Freescale continue to offer these customers relevant and competitive solutions for the future. In base station projects, the Enea Base Station Platform is used together with Freescale QorIQ Qonverge hardware to enable more calls and users and to maximize data transmission speeds with minimal latency. Customers all over the world already recognize the benefits of the QorIQ Qonverge architecture for fast data transmission. Enea’s complementary software solution scales fast data transmission to more simultaneous users while preserving scalability and usability among QorIQ Qonverge platforms.

## Competitive Solutions for the Future

The Enea Base Station Platform consists of the Enea Linux® distribution with real-time enhancements, IP transport and IPC communication along with the tools and middleware add-ons for the 3G and 4G LTE stack to implement a high-performance base station/small cell product. Enea software solutions are a perfect match for Freescale’s QorIQ Qonverge BSC and B series baseband SoCs scaling from small cells to large cell multistandard base stations.

“For complex multistandard macro cell projects, our customers typically want to focus time and resources on their value-added applications rather than on an operating system,” according to Conny Öhult of the Enea CTO office. “For Freescale silicon, Enea’s software platform enables that. Our customers want to get the most value possible out of high-performance QorIQ Qonverge platforms.

They ultimately need to be able to add more users and more data, and upgrade their equipment so that their end customer—the service provider—can scale. Our software is designed, with Power Architecture technology in mind, to be flexible and allow a large number of users to be added very quickly, providing the best possible user experience with high throughput, low latency and without disruptions.”

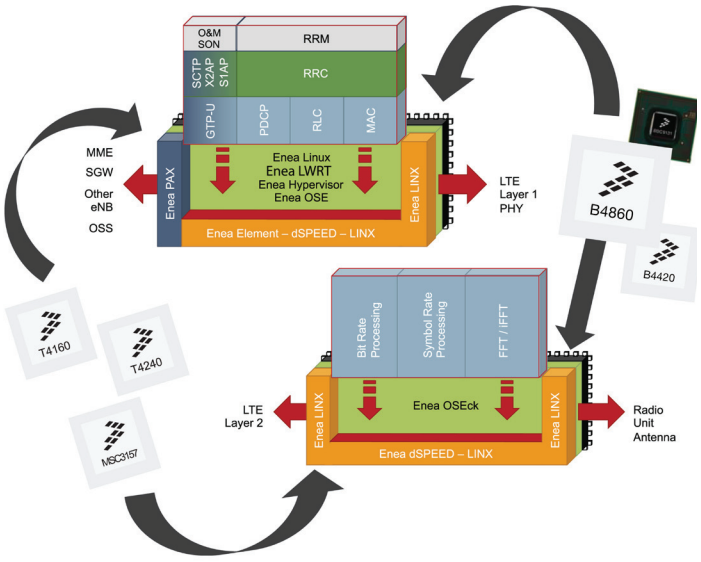
## Freescale’s QorIQ Qonverge SoCs

Freescale’s QorIQ Qonverge platform of systems on chip (SoC) combines Power Architecture cores and high-performance StarCore DSPs with application accelerators for packet and baseband processing, security and more. Freescale’s comprehensive R&D scale and ownership of fundamental IP, combined with system knowledge, enable heterogeneous multicore innovations for next-generation systems.

The QorIQ Qonverge BSC series offers operators a comprehensive portfolio of multimode solutions built on a common architecture. The QorIQ Qonverge BSC913x family offers operators a balanced architecture for system partitioning with balanced SC3850 StarCore DSPs for layer 1 and the Power Architecture-based e500 core for layer 2 and above. The family is designed to allow operators to easily scale from small cells to large cells without significant redesign and investment.

The Freescale QorIQ Qonverge B series of baseband SoCs brings together the processing power of the e6500 Power Architecture core and the computational power of the SC3900 StarCore-based DSP core along with proven application accelerators for packet and baseband processing, security and more. B series processors offer base station designers a low-power, cost-effective solution based on 28 nm process technology. The series is scalable from small cell to large cell base stations supporting LTE, WCDMA and LTE Advanced standards. B series SoCs also integrate the industry’s best combination of efficient, high-performance cores and application-specific accelerators while balancing power and cost.

The QorIQ Qonverge BSC series addresses the diverse processing needs of connected industrial nodes by combining a DSP with a network processor to give designers the ability to reduce chip count, board space and power consumption. The combination of these two core technologies provides industrial applications, such as power relays/power protection, factory automation, defense unmanned vehicles and software defined radio, a cost-effective solution to specialized designs that might currently be done in ASICs or discrete processors.




Based on Freescale QorIQ, StarCore and QorIQ Qonverge SoC series platforms, the Enea Base Station Platform encompasses the Enea Linux distribution with real-time capabilities and IP transport, IPC communication, plus tools and middleware needed by the 3G and 4G LTE stack and use-case specific application parts to implement a high performance base station/small cell product.

## Enea Software Solutions

The Enea Linux Base Station Platform includes runtime communication and tools for customers to analyze their software and reach maximum efficiency relative to the hardware. Enea supports Freescale Linux on the Power Architecture-based core. The Enea Base Station Platform provides a superior foundation for base station equipment manufacturers to add the LTE L2 and L3 protocols of their choice.

The distinctive value of the Enea Base Station Platform offering is in the underlying implementation that features many innovations for performance and scalability. A novel light-weight runtime (LWRT) threading model offers 10 times the performance of Linux pthreads in the Linux user space. LWRT implemented on a BSC series offers up to 10 times lower interrupt latency compared with the real-time Linux patch (PREEMPT_RT). Enea LINX is one effective and complete inter-process communication (IPC) solution for base station L3, L2, layer 1 (PHY) and radio integration acceleration.

Enea LINX provides an effective and scalable base station IPC solution for intra- and inter-core and device messaging and data transport within the base station CPUs, DSPs and with the radio unit. Enea's OSEck solution provides a foundation for accelerating the high-performance layer 1 (PHY) implementation for both macro/micro cells and small cells that are based on Freescale QorIQ and StarCore devices as well as Freescale's QorIQ Qonverge SoC platform series (BSC and B series).

Enea has a broad product portfolio that starts with operating system software for the QorIQ and QorIQ Qonverge families and for Freescale DSPs. IPC software, which supports Linux, is fundamental not only to the RTOS and applications, but also to the tools and management software. The Enea RTOS is another operating system environment. Enea's data plane management software and control plane management software allow customers to connect the network management layer all the way down to the lowest DSP device layer. "Enea provides a very complete software portfolio for customers that are using Freescale silicon," said Andersson.

## About Enea

Enea is a global software and service company delivering solutions for distributed, communications-driven products. With over 40 years of experience, Enea is a global leader in the development of software platforms that require performance, stability and scalability. Enea's expertise in real-time, Linux, hypervisor and multicore software development platforms shortens development time, lowers development costs and minimizes the development cycle while increasing reliability and platform longevity. Enea's vertical solutions cover mobile product development, telecom infrastructure with emphasis on data-intensive packet processing applications, medical technology, industrial automation, automotive and military/aerospace applications.

For more information about Enea, visit **enea.com**.

**For more information about Freescale QorIQ Qonverge products, visit freescale.com/QorIQ**



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