DSP Offers Next-Generation Acceleration

Freescale Semiconductor has introduced its MSC8155 digital signal processor (DSP), a higher performance and cost-optimized version of the company's flagship MSC8156 DSP based on the latest StarCore technology. The MSC8155 includes next-generation acceleration and interconnect technologies that boost overall chip performance and further enhance the capabilities of broadband wireless base station equipment.

Similar to the MSC8156, the new MSC8155 processor integrates six SC3850 StarCore DSP cores running at 1 GHz on a single die, delivering 6 GHz of raw DSP performance. The SC3850 core recently earned the best-ever fixed-point BDTImark2000 benchmark score from independent signal-processing technology analysis firm, Berkeley Design Technology, Inc. (www.BDTI.com).

Major enhancements to the MSC8155 include a second-generation version of Freescale's multi-accelerator platform engine acceleration block (MAPLE-B2L) and the newest interconnect Serial RapidIO® Gen2 technology. The MSC8155 DSP supports existing 3G-UMTS, TD-SCDMA and WiMAX base station deployments and upcoming 3G-LTE standards such as FDD-LTE and TDD-LTE features including Turbo/Viterbi FEC.

"The MSC8155 DSP brings even greater functionality and higher system performance to baseband and industrial applications," said Scott Aylor, general manager of DSP products for Freescale's Networking and Multimedia Group. "Building on the innovation and market traction of the MSC8156 device, the enhanced MSC8155 offers OEMs the scalability and connectivity they need for their common base station platforms."

The new DSP is designed to help original equipment manufacturers (OEMs) take full advantage of 3G-LTE, HSPA+ and WiMAX at very high throughput required for the most advanced 20 MHz 3G-LTE and HSPA+ basestations. The raw performance of the fully programmable cores and the MAPLE-B2L acceleration technology also eliminate the need to incorporate costly FPGAs or develop ASIC devices for 3G-LTE and WiMAX base stations.

"The MSC8155 continues Freescale's demonstrated expertise in delivering DSP devices that support multiple standards to meet the base station requirements of today and tomorrow," said Will Strauss, president of Forward Concepts, a leading analyst firm tracking DSP technologies. "The flexibility of Freescale's enhanced MAPLE technology, together with the high performance of Freescale's StarCore technology, should prove appealing to OEMs looking to keep up with carrier and consumer demand for ever more bandwidth as smart mobile devices advance and the number of Internet users worldwide continues to explode."

The MSC8155 DSP is code- and pin-compatible with the MSC8156, thereby easing

migration and allowing for deployment of both parts in a single wireless base station design. The versatility of the new DSP enables multi-standard software definable radio for common base station platforms and helps OEMs save operating expenses by taking advantage of core programmability and the multi-standard baseband accelerator.

The enhanced MAPLE-B2L baseband accelerator embedded in the MSC8155 DSP gives OEMs more headroom to easily add differentiating features. MAPLE-B2L delivers exceptional overall performance to meet extremely high data rates and very low latencies required by next-generation broadband wireless base stations. The accelerator features a new and extremely high performance Turbo encoder, a higher throughput Turbo decoder and Fourier transforms acceleration engines.

The MAPLE-B2L offers turbo decoding with rate de-matching and HARQ-combining capacity of up to 330 Mbps at eight iterations, Viterbi decoding of up to 200 Mbps and turbo encoding with rate matching capabilities up to 900 Mbps. The embedded FFT engines support up to 900 Msps of FFT/iFFT or 630 Msps of DFT/iDFT throughputs. And it also provides CRC check or insertion with up to 10 Gbps throughput.

To support the high throughput generated by the six high-performance cores and MAPLE-B2L, the MSC8155 is equipped with the latest Serial RapidIO Gen2 standard serial interface supporting up to 5 Gbaud per lane and featuring enhanced messaging unit support for Type 9 streaming that enables the combination of multiple and different types of data streams over the same interconnect. It delivers up to 16 Gbps bandwidth for each direction to enable high throughput interconnect between multiple devices on multi-DSP multi-sector base station channel cards. Other high bandwidth peripherals include Dual Gigabit Ethernet SGMII/RGMII and 64-bit DDR2/3 memory interface at 800 MHz.

Freescale offers a full set of development tools and enablement software for the MSC8155 device. The CodeWarrior Integrated Development Environment (IDE) leverages Eclipse technology to provide a comprehensive multicore development environment. It includes C and C++ optimizing compilers, a source level debugger, core and device simulators, software analysis plug-ins for profiling and program/data trace, and the royalty-free SmartDSP operating system delivered with optimized device drivers. Development boards are available to enable software development along with a set of reference software components for key 3G-LTE algorithms.

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