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Freescle reboots basestation DSPs, leapfrogs TI

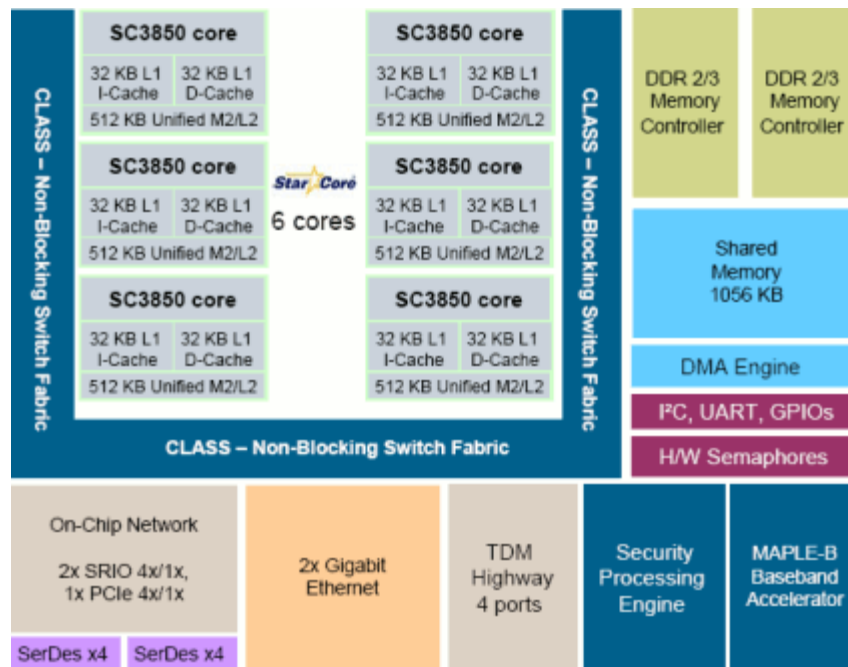
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Freescle today announced the MSC8156, a wireless base station DSP boasting 6 GHz of performance. The chip is the successor to the quad-core [MSC8144](#) launched in May 2006. Compared MSC8144, the MSC8156 offers three times the performance and a much lower bill-of-materials (BOM). Despite the massive upgrade, pricing for the MSC8156 starts at \$192 in 10,000 unit quantities—only slightly more than the old MSC8144. Freescle kept the price down with a process shrink from 90 nm to 45 nm.

The MSC8156 uses a new version of the StarCore DSP architecture, the SC3850. The SC3850 features many upgrades, most notably a doubling of MAC throughput to eight 16-bit MACS per cycle. The MSC8156 features six SC3850 cores running at 1 GHz each, giving the chip 48 GMACS of DSP performance—three times more than the older MSC8144. (GMACS, or billions of multiply-accumulate operations per second, is a rough measure of DSP performance.)



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The MSC8156 also incorporates the programmable MAPLE-B accelerator. The accelerator supports Turbo and Viterbi decoding, FFT/IFFT and DFT/IDFT operations typically performed in FPGAs. (The MAPLE-B accelerator was first unveiled in the stand-alone MSBA8100 announced in June. See [our coverage](#) for details.) By eliminating the FPGA, the MSC8156 provides substantial reduction in BOM and board space. Freescle states that a single MSC8156 can replace two MSC8144 DSPs and an FPGA, reducing board area from 100 mm² to 28 mm².

According to Freescle, the MSC8156 is able to handle a broad range of next-generation standards, including 3G-LTE, TDD-LTE, TD-SCDMA, and WiMAX. For example, a single MSC8156 is able to handle Layer 1 processing for an entire 3G-LTE sector.

As impressive as the MSC8156 is, the chip represents more than just a new performance milestone—it also demonstrates Freescle's commitment to the infrastructure market. Freescle is [getting out of the handset business](#), where it has been hit by the decline of its main customer Motorola, as well as consolidation among handset processor vendors. Given the long lapse since

Freescale's last infrastructure DSP announcement, it looked like the company might abandon that market as well. The MSC8156 puts those fears to rest. "Freescale is committed to staying in the base station market," says Will Strauss, President and Principal Analyst at Forward Concepts. "This introduction underscores that commitment."

Freescale's focus on infrastructure makes sense. According to Tony Massimini, Chief of Technology at Semico Research, revenue for infrastructure DSPs shot up 21.5% this year, compared to a mediocre growth of 6.5% for the overall DSP market. Freescale also has a unique advantage in infrastructure thanks to its in PowerQUICC processors, which dominate the market for infrastructure network processing.

The challenge for Freescale will be to displace Texas Instruments, which holds a dominant position in base station DSPs. The good news for Freescale is that it has a solid lead in performance. TI's top-performing infrastructure DSP is the [TCI6487](#), a 3-core, 1 GHz DSP. Comparing multicore performance is a tricky, but a simplistic comparison of 16-bit GMACS gives the MSC8156 a 2X performance advantage.

Freescale also has an advantage with its MAPLE-B accelerator. "The MSC8156 is the only DSP that claims to not need any FPGAs or ASICs to augment it for 3G/LTE base stations," notes Forward Concept's Strauss. Although TI's chips include accelerators, they do not eliminate FPGAs. Thus, it appears that Freescale's accelerator gives it an additional performance advantage.

Of course, performance isn't everything—cost and power are also important. Things look good for Freescale in both areas. Although TI has not released pricing for the TCI6487, the essentially identical [C6474](#) is priced at \$199 in 10,000-unit quantities—about the same price as the MSC8156. This suggests that the MSC8156 offers more performance per dollar than the TCI6488.

In terms of power, TI quotes 6-7 Watts for the TCI6487, while Freescale quotes 10 Watts for the MSC8156. Although the MSC8156 burns more juice, it also offers more performance. On the balance, it is likely that the MSC8156 offers more performance per Watt than the TCI6487.

Looking down the road, Freescale plans to extend the line with chips for video infrastructure and for voice infrastructure. TI is also sure to respond with new chips of its own. "TI does not sit on its laurels," says Semico's Massimini. "Sometime in the near future they will have an answer to this." Thus, it looks like the once-staid infrastructure DSP markets are set for a fierce battle.

Freescale plans to sample the MSC8156 to alpha customers during the first quarter of 2009. It is offered in a 783-pin FC-PBGA package. The company plans to offer the device in two versions, based on different core speeds of 800 MHz and 1 GHz. Pricing starts at \$192 for 10,000-unit volumes.

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