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Mobile Core Wars

The battle is underway. Companies that supply processors for mobile devices are waging a campaign to convince users that the more cores they have in their devices, the better. The PC market has been in a “core wars” state for several years now, as Intel and AMD have added more cores to their processors. And for the most part this has raised performance (and the expectations of users). But does a user that primarily surfs the web and does email on a mobile device really need a multi-core processor?

For simple emailing, texting and basic web browsing, the need for multi-cores is minimal or non-existent. Current smartphones with capable single cores do quite well at these mundane tasks. But for many of the “new mobile capabilities” envisioned on these devices (e.g., 3D, graphically intense gaming, HD video, etc.) there is a real requirement for more processing power. However in these scenarios the real benefit for multi-cores often comes not from having more CPUs, but from having more GPUs. And here, the core wars gets really interesting.

Several vendors have already announced their intent to ship multi-ARM core CPU chips (e.g., NVidia will ship a quad core product in Q3, followed by Qualcomm in early 2012, followed by TI, Samsung, ST Ericsson, Marvel, etc.). But for the intense graphics capabilities mentioned earlier, it's generally the number of and power available from the GPU that makes the difference in visual performance that the end user sees. And it is in this area the battle lines have been drawn.

NVidia, with years of high end graphics expertise in the PC space, has staked out the high end by including 12 GPU cores along with its four CPU cores in its upcoming chips, and delivering it ahead of chief rival Qualcomm. Qualcomm, which acquired the low power GPU business from AMD, is responding with its own in-house designed multi-core GPU in upcoming chips. Samsung, ST Ericsson, TI and others have all stated their intent to join in the fray, although at later delivery dates than NVidia and Qualcomm.

In the graphics core licensing technology area, ARM has initiated a battle with long time leader Imagination Technologies as to who's GPU IP will be included in licensed chip designs for the many chip vendors who don't own their own graphics IP. ARM is relatively new to the GPU battle, having announced its intention to play here only recently. Imagination Technologies, by contrast has been the primary licensor of ARM attached graphics capabilities (and for other chip architectures as well, including Intel's Atom). So far Imagination Technologies is winning this battle, as it recently announced a major deal with several chip vendors that were previously

looking at ARM graphics designs (e.g., ST Ericsson). It's going to be an uphill battle for ARM in graphics, although it may win in some lower performance, cost oriented designs.

While most people believe ARM is synonymous with mobile devices, Intel and its Atom line are putting pressure on the mobile space (especially in tablets) with next generation Atom chips now coming to market. Atom is finally achieving excellent performance at reasonable power levels, an area that Atom was well behind the competition in previous versions. Intel will need to compete in the core wars, more for prestige and less for performance in my opinion (it may be able to do more per core than ARM, but most consumers won't get the distinction and will demand equivalent core numbers). And Atom will need to show graphics-oriented performance on a par with multi-core GPU implementations from NVidia and Qualcomm in particular.

Bottom line: The "core wars" are heating up, and promise mobile devices with far more functionality. However, a tradeoff needs to be made between increased performance, battery power, heat generation, and device costs. This is less critical in tablets where batteries are bigger, BOM costs are more flexible, and where users have greater performance/functionality demands. But increasing the number of cores in smartphones and other small form factor devices will take a longer time to emerge, and will need to take advantage of the "ripple down" effect of lower chip costs over time, reduced chip geometries for power savings, and increased app functionality, before it takes hold. In the mean time, users should select a device not based on the number of cores, but on the overall performance, functionality required and tradeoffs desired (e.g., battery life, size of device, costs, primary use).

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For more in-depth comments or analysis on this or other subjects, feel free to contact us.

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