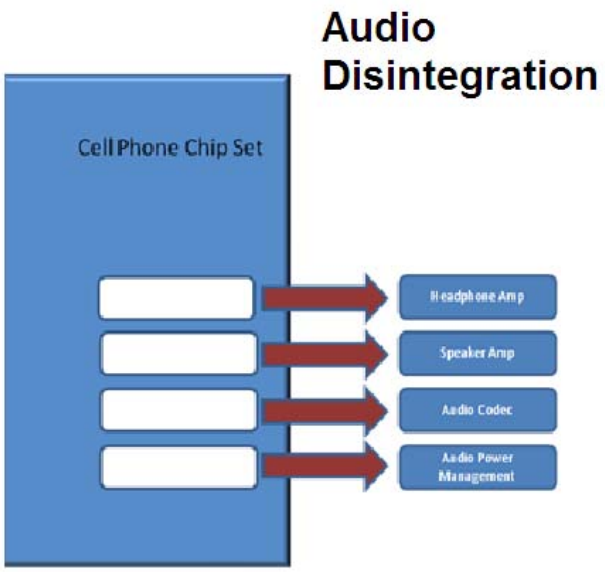
Disintegrating Audio In Mobile Phones

The race to provide differentiating features on mobile phones is now intensifying because consumers have become quite fickle since they have an increasingly wide variety of mobile products to choose from. They demand the latest and coolest features. So, cell phone manufacturers must look everywhere they can for a competitive edge, and audio has emerged as a key competitive battleground. Personal electronics consumers have simply tired of the mediocre audio performance that has been much too common on handheld products and are demanding that the tiny speakers in their handhelds sound great without draining their batteries. This is nearly a contradiction.

To rise to such a daunting challenge integrated circuit (IC) makers have to force disintegration, which seems a bit of a dichotomy for companies who integrate for a living. Disintegration of audio is defined as pulling audio functions out of the main cell phone chipsets in order to isolate audio functions. This allows audio performance to evolve faster than if it remained trapped inside cell phone chipsets. By taking audio external there is also the additional and important benefit of allowing the audio and cell phone chip set ICs to be built from different process technologies, freeing each to evolve unencumbered by the other's process requirements.



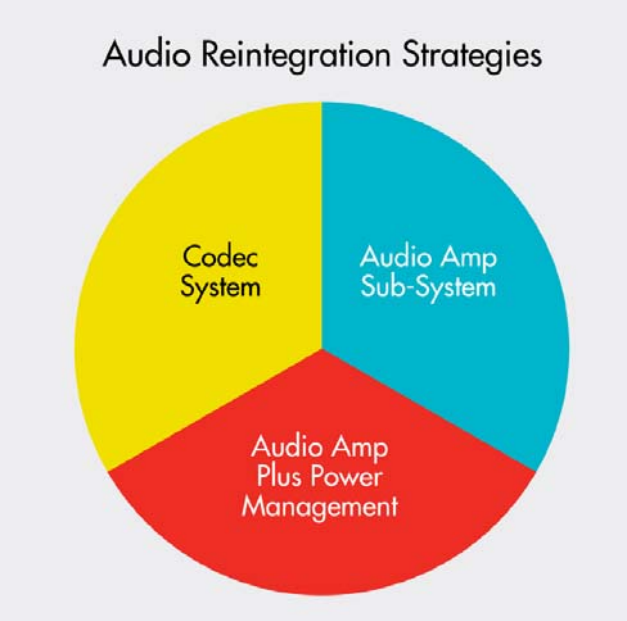
In semiconductor industry parlance, moving functions from one chip to another is called "repartitioning". The audio blocks that are being repartitioned out of the main cell phone chipsets are often attracting fellow travelers such as power management blocks, which makes perfect sense since the other side of the great sound from small cell phone speakers equation is the battery driven environment. Putting power management plus audio circuits in the same IC is driving IC makers in from

different places. Given the range of companies and competencies, the cell phone audio market is certain to accrue a great deal of innovation.

If you think about it, the notions of power and audio have always gone together. The main measurement of audio prowess in the early audiophile days was power (wattage). But now, with mobile being the most popular audio platform, the concern has become, "How do you get the wattage to drive speakers from a small battery while not draining it so fast that the product is really not any fun?" IC makers have figured out that managing power is the key to fun audio products and cell phone makers are looking to the IC guys to make it possible. Several different technical approaches are emerging due to repartitioning. First is the addition of power management to stand alone headphone and speaker amps. LDOs, boost and buck DC/DC converters and battery management circuits are attaching to different classes of audio drivers. No discussion of audio drivers can really avoid mentioning the alphabet soup of audio amplifier technologies, namely Class AB, Class D, Class G, Class H and various eponymous classes (where the kids are named after the parents) such as Class W. It is still early in the disintegration /reintegration evolutionary cycle, so several other species of ICs are vying for cell phone survival. One of the new species is the so-called audio subsystem which combines headphone amplifiers with speaker amplifiers on a single chip. The other major example is audio codecs with a pile of innovative functions packed inside.

Higher output, higher quality, higher efficiency, and higher levels of integration (that should be audio re-integration) have animated the creation and reassembly of different combinations and amplifier types for use in cell phones. The cell phone audio subsystems now appearing commonly start with a Class D amp to drive speakers and then adding Class AB, D or G to drive the headphone amps, depending on the particular vendor. While the emerging audio subsystem exemplifies combining technologies, the real mix-and-match nature of audio disintegration/reintegration is seen it its full glory in sophisticated new audio codecs, which are true audio systems in and of themselves.

Cell phone makers are savvy to the value highly integrated codec systems can bring, especially to their smart phone platforms by providing a variety of complex functionality in a very compact device. Going forward, smart phone codec systems will include a wide array of features such as headphone and speaker drivers (choose a class), parametric equalizers, sound mixing, dynamic range control, noise cancelling, beam steering, echo cancelling, 3D sound processing, microphone array interfaces, and various audio interfaces, just to mention a few of the possibilities. Many of these functions are highly compatible with Digital Signal Processing (DSP) which is starting to show up as a key element of cell phone audio's future which will only grow in importance.



Although the end result is still to be determined and may wind up being continuous change, the trend at least is becoming very clear: Disintegration has freed audio/power management IC engineers to reintegrate a variety of functions into stand alone amps with power management, audio amp subsystems, and sophisticated audio codec systems, making cell phone audio's future sound very, very good. One thing for sure is that the evolutionary process now underway in cell phone audio ICs would surely make Darwin proud.

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