

Cellular Phone Development Challenges and Solutions

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Cellular phone development has brought developers many new challenges. Incorporating the latest features and beating competitors to the marketplace are common driving forces for cellular phone designers. Many developers are now making full use of embedded MPUs with mobile features built-in and high processing speeds.

Today's cellular phone designs must be able to (1) save on power consumption in order to extend the duration of a call and/or stand-by modes; (2) deliver high-speed execution of large application programs; (3) offer Video Phone, MPEG4, and Mega-pixel Camera functions along with many other advanced features; (4) have multi-lingual options that can quickly change between English, Spanish, Japanese etc.; (5) be able to process a huge amount of data in order to support a sounds and/or process images quickly; (6) guarantee security of internal data and provide incoming/outgoing data protection. Using a "Full Featured Debugging Tool" designers are able to quickly and easily address these types of development challenges. Here are four examples:

CHALLENGE 1: IDENTIFYING THE CAUSE OF A FAILURE

In most cases, probing for and specifying a "Trace Trigger" will identify the failure area by checking the current operation status of any candidate problem (such as a noise bug, a chip bug, etc.). Being able to set a "Trace Trigger" is one of the key features of a "Full Featured Debugging Tool" and where regular JTAG emulators fall short.

CHALLENGE 2: SAVING BATTERY POWER

Surprisingly enough, a cellular phone's MPU is asleep most of the time in order to save on power consumption and is wakened only when a timer/key interrupt occurs. Therefore it is imperative to know, on the basis of real

time operations, when these transitions from sleep to wake modes occur. Efficient transitions means more power savings on the battery and can be 'tuned' by counting the trace records in multiple unit steps – such as a bus cycle, external clock, or by using 15ns ticks of the "Full Featured Debugging Tool" internal clock. This enables the developer to continuously record a trace without depending on the MPU's operating mode.



CHALLENGE 3: INCREASING THE EFFICIENCY OF CACHE MEMORY

Cache was traditionally thought of as a "passive resource" and was originally designed to avoid duplicating a fetch to external resources (low-speed processing), allowing for higher speed operations, and resulting in decreased power consumption. However there is a trend among embedded MPU manufacturers to install more and more cache within the silicon. The reason is because when it comes to cellular phones, developers are using cache in more assertive ways. For example, cache is now being used to increase efficiency or to avoid access of banked memory which has a negative effect on power

consumption. In order to take advantage of the increased availability of cache memory, developers need to be able to access memory distribution maps. This can easily be done by tracking the "Coverage & Performance" of the MPU that can be hard to extrapolate using only theoretical calculations.

CHALLENGE 4: UNDERSTANDING THE ENTIRE CACHE OPERATION

It is becoming more and more necessary for developers to know the exact operation status of the cache operation. By combining a "Bus Trace" and "PC Trace" in order to get the execution record, a developer can quickly get an entire cache perspective. The advantage of combining a Bus trace and PC trace is that with a PC trace, "Fetch" cycles are recorded and with a BUS trace instruction pre-fetched and skipped are recorded.

There are many more solutions to common developer challenges that a "Full Featured Debugging Tool" provides that can practically increase the chances for cellular phone designers to (1) implement a first-to-market strategy (2) with all the state-of-the-art cellular phone features. This is why the large high-tech companies in Japan are using "Full Featured Debugging Tools" as a key part of their debugging process.

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