



CAS Latency: What Is It, and How Does It Impact Performance?

This is the question the RAM Guy gets asked more than any other question. So, I figured I'd put together a bulletin containing my \$0.02 worth!

First of all, what is CAS?

"CAS" is short for "Column Address Strobe". A DRAM memory can be thought of as a matrix, kind of like a spreadsheet with memory cells instead of numbers and formulas. Like the spreadsheet, each cell has a row address and a column address (like "AA57" or "R23C34" in the spreadsheet). As you might have guessed, there is also a RAS signal, which is shorthand for "Row Address Strobe".

And, what do you mean by "latency"?

Latency refers to the time that you are waiting to get what you need. Merriam-Webster dictionary defines it as "the interval between stimulus and response".

Now, how does CAS work?

To understand this let's walk through a simplified version of how the memory controller actually reads the memory. First, the chip set accesses the ROW of the memory matrix by putting an address on the memory's address pins and activating the RAS signal. Then, we have to wait a few clock cycles (known as RAS-to-CAS Delay). Then, the column address is put on the address pins, and the CAS signal is activated, to access the correct COLUMN of the memory matrix. Then, we wait a few clock cycles -- THIS IS KNOWN AS CAS LATENCY! -- and then the data appears on the pins of the RAM.

So, for CAS-2 you wait 2 clock cycles and for CAS-3 you wait 3 clock cycles?

Bingo!

So, CAS-2 is 33% faster than CAS-3?

Whoa, not so fast! There are a LOT of other factors in the memory performance. Here are a few of the main ones:

- Sometimes you have to move to a different row in memory. This means activating RAS, waiting RAS-to-CAS delay, then doing the CAS latency thing.
- Other times, you do a "burst" read, when you pull in a lot of data in one big block. In that case, CAS is only activated ONCE, at the beginning of the burst.
- Also, don't forget the most important thing: processors have big caches! The cache is where the processor stores recently accessed instructions and data. The cache "hit rate", i.e., the percentage of times the processor finds the information it

OK, OK, so what's the bottom line?

So, the bottom line is, moving from CAS-3 to CAS-2 will offer a percentage performance increase in the low single digits for most applications. Programs which are known to be memory intensive (you gamers might know of some...) will see the best improvement.

The other thing to keep in mind is that CAS-2 memory will run FASTER (some review sites have taken it to 160MHz!) than CAS-3 memory. So, if you're thinking of overclocking your system (now or in the future), CAS-2 is your best bet for speed and stability.

So, the Ram Guy sez...

Buy CAS-2 if [1] you want to wring the last bit of performance out of your system, or [2] you're thinking of overclocking, either now or in the future, or [3] it costs the same as CAS-3, which it sometimes does...

Otherwise, CAS-3 memory should meet your requirements