Ubiquitous communications

Brian Bailey - October 31, 2012

When you look back a short space of time it often appears as if little has changed and yet when you look back over a longer period you are suddenly amazed at how much changed. It also amazes me how a significant change can creep up on you and you are unaware of it really happening for a long time and then suddenly you realize the magnitude and significance of it. I am becoming a believer in one of those today and the change it will bring about is enormous. The irony of it is that within the chip industry we are seeing the reverse happen and yet we are designing these chips for the external impact. OK, time to stop being so cryptic. I am talking about the migration from computation to communications. It goes by many buzzwords in the industry - The Cloud, The Internet of Things, Smart devices and so many others that marketers dream up to try make their offerings appear different. The Cloud confused me for a long time because I just saw it as distributed computing.

Why do I say the chip industry is the opposite? For the longest time computation was expensive and communications cheap. We could ignore wire delays as being insignificant. The switching times of gates were all that mattered. Today we have seen the reverse of that - communications takes all the time and processing can be considered to be instantaneous. Routing delays are now one of the biggest challenges in achieving timing closure. But this is not just at the micro-device level. Getting data from memory is orders of magnitude slower than processors can perform calculations, off chip communications is a bottleneck and parallel interfaces are nearing the end of their life due to jitter and other effects. DDR is perhaps the last holdout of significance having just released another parallel bus standard but many say this will be the last as the gains in this standard may be very difficult to realize in real systems. The emerging field of 3D ICs creates an intermediate form of communications in that what were separate chips in different packages will be connectable with much lower capacitance and other parasitics.

But the off chip paradigm shift that is happening is related to information and how it is used and that in turn has been made possibly by the increased data rates and data security associated with wireless communications and the bandwidths available for interconnect. Back in the days when being connected meant a 300 baud modem, it was often a challenge to even do remote editing on a dumb terminal. Today we have fiber optics into the house running at an average of almost 30Mbps and 4G wireless at that can peak at around 100Mbps and there are no signs of them topping out in the near future.

The increase in compute capabilities also that means that communications is minimized because by employing sophisticated compression algorithms, that were not possible in the past, it can optimized even further. We are perhaps seeing the fastest rate of change happening in automobiles with many cars becoming fully connected, not just how they came out of the factory, but with the ability to connect to your own devices and for them to fully network together. Maps, GPS and traffic conditions, phone, music and other entertainment are there and there is the promise of a lot more - some of which will have to overcome privacy issues before becoming fully accepted. What about
those ads and special deals that will be presented to you as you drive past your favorite store or the store that wants to suggest something related to the other purchase you just made, or the pop up telling you that one of your friends appears to be heading to the same place as you? Many people are also working on car-to-car networks, a technology that would move us one step closer to autonomous cars.

Where do you see the biggest changes or the biggest impacts?

Brian Bailey – keeping you covered

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