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Thursday, March 4, 2010

## SoCs stalk the networking market, and global finance is an issue

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Presenters at the Semico Outlook 2010 briefing this week frequently mentioned buildout of the global broadband network as a key near-term market for SoCs. The basic parameters are well-known. Growing demand for HD video over IP networks and growing Internet use by [smart phones](#) and [netbooks](#) are driving up network bandwidth requirements faster than carriers and service providers had anticipated. So there is a scramble to install higher-bandwidth links and to implement advanced traffic management services to get the most out of what physical bandwidth is available.

Because this buildout is both global and expensive, there is a second dimension to it, orthogonal to the technical roadmap created by the [SoC](#) developers. That dimension is international finance. Profound differences in the way service providers will pay for their buildout will influence the technology paths they choose.

In much of Asia the buildout is a priority for national governments, and is funded by them. South Korea's fiber program, for example, has already given the typical urban household there access to bandwidth that most US businesses can only dream of. China, between direct funding and a government-mandated explosion in business credit, is on the same path.

"In China there is huge government investment," said Young Sohn, president and CEO of Inphi. Bradley Howe, vice president of IC engineering at Altera, agreed. "Right now, China is huge."

But the situation in the USA is entirely different. With a fragmented infrastructure in the hands of public corporations and with nothing resembling an [industrial](#) policy at the national level, individual service providers are in a very difficult bind. Borrowing for the buildout will be tricky. Short-term financial markets are still damaged from the collapse, and corporate bond markets, while once again active, will be problematic if you can't explain how your borrowing will increase your revenue.

And for the domestic carriers, that is the rub. "Last year there was some stimulus money, but now we are back to natural demand," said Lisa Su, senior vice president and general manager at Freescale Semiconductor. "But natural demand is an issue. Service providers are working with fixed capital budgets."

The underlying problem for both fixed and [mobile service](#) providers is that by all indications, individual household spending for connectivity has topped out. "People are doing things that require more bandwidth," Howe observed, "But nobody wants to pay for more bandwidth." So while end customers are demanding the results only a buildout can achieve, there is no evidence that the buildout will result in increased revenue for the carriers.

So what to do? As always the semiconductor industry's response to a difficult situation is innovation. "The carriers will have to control the pace of the buildout," Howe explained, adding that this deliberate pace is putting great pressure on system prices. "Right now we are seeing vicious cost battles among the system vendors, and they are pushing the cost pressure down the supply chain." That means slender margins and spread-out order flows for chip vendors who have to make their R/D investments now. And that in turn is forcing chip vendors to lean down their own processes: more product results per R/D dollar, more IP reuse and design [outsourcing](#), tighter focus on differentiation, and partnering with customers to help fund development. And it means finding technical solutions that help carriers stretch out their capital spends.

Fortunately, there is some good news. "There are fewer competitors now, so chip vendors have more pricing leverage," Sohn said. "And there's more opportunity to partner with customers." So with slimmed-down R/D teams tightly focused on specific customer needs, semiconductor vendors are working to put new systems within the capex plans of the carriers.

This is part of a repeating pattern, according to Mentor Graphics chairman and CEO Walden Rhines. "Historically, there has been a spike of innovation after each

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recession," Rhines said. "Price and cost reductions during the recession make technology available at lower price points, enabling new markets." So the recession that has hammered much of US industry and crippled employment may have also brought advanced analog transceivers, complex FPGAs, and **multicore** SoCs to a price point where carriers can actually afford to deploy the next generation of systems.

China and probably India will press ahead in any case, as Korea and Japan have already done, deploying bandwidth by brute force if necessary. But the US buildout cannot rely on a massive capital investment, and so cannot simply mean fiber-to-everything and 100 Gbit switches everywhere. Rather, the US carriers will have to depend on finesse: scalable multiservice equipment that can be deployed gradually on a nearly pay-as-you-go basis, improved bandwidth utilization for media payloads, and only gradual increase in fiber penetration. That difference will directly influence the way system vendors and **SoC** designers define their design requirements.

As an interesting side note, other speakers at the Semico event described an almost identical situation for the US electric utility sector. US electricity consumption has begun to grow again, and could face a serious acceleration if plug-in hybrid or electric vehicles should become popular. Bart Ladd, general manager at NEC Electronics America, said that at current trend, US electricity generation will fall behind consumption in 2015. Long before that the current US distribution grid will be so near its limits that it will become unstable. So for electric utilities, as for communications carriers, network efficiency is absolutely vital. "We are seeing an inflection point in connectivity for embedded systems," Ladd said, "driven by the supply shortfall. The Smart Grid will be the backbone, but the network will be home-centric."

In this case as well there is a multiway mismatch between the investment required, the short time frame, the industry means to fund a major capital improvement, and the seeming lack of interest or comprehension at the national level. And unlike data networking, the picture for the Smart Grid is complicated by the lack of established standards. So it is not clear how this market will develop. "There are 130 million homes in the US, so this is a major opportunity," Ladd said. "But the growth path is unpredictable."

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