

Is ITC Bored with Board Test?

Kenneth M. Butler

Texas Instruments Inc.
12500 TI Boulevard MS 8645
Dallas, TX 75243

If you look at the mix of papers published at ITC over the last ten years or so, there does appear to be a large swing away from board test topics and towards more IC-oriented technical papers. Why is that?

Could one argue that board test became a solved problem after the introduction of the IEEE 1149.1 standard [1]? Hardly, since that original standard, as useful as it has proven to be, was still deficient in a number of areas and is being actively extended even today. The most notable recent extensions are the 1149.4 analog interface and the proposed P1149.6 extension for high speed digital signals.

As an ASIC vendor, we work with many different companies on implementing ASICs in a variety of applications. Often, given the choice, our customers would opt not to implement boundary scan on their designs. It's not clear if this is indicative of the perceived difficulty in using the approach, a lack of familiarity with the tools involved, the use of other more desirable solutions, or some combination of the above.

Clearly, boards are not going untested. So, either via JTAG or other means, solutions exist for board level testing. But, if board manufacturers are opting for non-1149.1 test procedures, the question remains, why do we not see more active research in this area? There are probably at least two reasons:

- The rapidly increasing level of integration and the proliferation of system-on-chip (SoC) designs. For ASICs and non-ASICs, the average number of transistors on a die is increasing at a very rapid rate. This growth tends to change the problem focus to "how to test the chip" instead of "how to test the board". The emergence of the P1500 standard is evidence of that trend [2].
- The mobile revolution. Wireless handsets, PDAs, and other portable electronics are ubiquitous. If we take mobile phones as an example, they are little more than an SoC, a display, a power supply, a keypad, and some support circuitry. And the single chip mobile phone is itself very nearly a reality.

If we consider academic instead of industrial research, I think the tendency has always been for universities to focus on IC-oriented problems and less so on board test problems. The reason for this trend is simply that board test problems tend to be more pragmatic in nature, while chip test problems more readily lend themselves to the application of theoretical concepts. The fact that the board can in some sense be viewed as a "disappearing" commodity will just increase the emphasis universities place on chip test issues.

So, how should the board test community utilize ITC and other similar forums? First of all, as a means to drive the development, refinement, and adoption of standards such as IEEE 1149.1 and IEEE P1500 and their existing and probable extensions. As stated above, there are a fair number of potential users of these standards who, for various reasons, prefer not to do so. The question of why merits further investigation and perhaps improvements to the existing standards or the creation of new ones.

Secondly, it should be used as a communication channel to/from the chip test community. If the bulk of ITC-reported research is done on ICs, then the board test community must voice their perspective and concerns to purveyors of chip-borne solutions and ensure that they are adequately addressed.

Finally, it should always be used as an excellent medium to gather information on future trends. Very often, new products in many areas are announced at ITC. It is also the best place to see the forward-looking problems being considered by university and other researchers. And of course the value of networking cannot and should not be underestimated.

[1] IEEE, "IEEE standard test access port and boundary-scan architecture," IEEE Standards Board, New York, NY, IEEE Standard 1149.1-2001, July 2001.

[2] _____, "IEEE standard for embedded core test," IEEE Standards Board, New York, NY, <http://grouper.ieee.org/groups/1500>, April 2001.